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THE MARGINELLIDAE OF ANGOLA: THE GENUS *GIBBERULA*

S. Gofas[1]

(*Accepted for publication, 21st May, 1988*)

Abstract: The Angolan species of the genus *Gibberula* (Gastropoda, Marginellidae) are reviewed, and five new species are described: *G. cristata, G. mimetica, G. tantula, G. mendacis* and *G. confusa*. The colour patterns of soft parts is described for these and for all previously described Angolan species, and is held to be essential for species recognition.

Résumé: Les espèces angolaises du genre *Gibberula* (Gastropoda, Marginellidae) sont revisées, avec cinq espèces nouvelles: *G. cristata, G. mimetica, G. tantula, G. mendacis* and *G. confusa*. Le polychromatisme des animaux vivants est décrit pour toutes les espèces, en soulignant son importance pour la taxonomie au niveau spécifique.

Resumo: As espécies angolanas do género *Gibberula* (Gastropoda, Marginellidae) são revistas, e cinco espécies novas vem descritas: *G. cristata, G. mimetica, G. tantula, G. mendacis* e *G. confusa*. O policromatismo dos animais vivos vem descrito para todas as espécies, frisando-se a sua importancia para a taxonomia a nível específico.

Marginellids are remarkably diverse and successful in most West African littoral environments. There is nevertheless little in common between those, best known, found north of the Gulf of Guinea (mostly Senegal and Mauretania) and those recorded to the south, which will be dealt with herein.

Dautzenberg (1913), Odhner (1923) and Knudsen (1956) have referred to marginellids of this area and described some of the species. The author has observed these species alive and encountered several other hitherto undescribed.

MATERIALS AND METHODS

Material for this study was collected along the entire coastline of Angola (Fig. 1) excepting the Cabinda and Soyo areas, in a survey carried out during the years 1981–1987, jointly with Francisco Fernandes, of Luanda. Material collected by the author, incuding all holotypes of new species, is deposited in Museum National d'Histoire Naturelle of Paris. Paratypes have been distributed to various Institutions as listed. Relevant material is also in F. Fernandes' private collection.

Collecting

(1) Infralittoral algal mat (low water mark to 2–3 m) on hard bottoms was sampled by brushing and collecting residue in a 0.5 mm nylon mesh net mounted on a frame.
(2) Infralittoral soft bottoms (low water to 1.5 m) were sampled with a small dredge with a wire-mesh of 5 mm, mounted on a 2 m handle.
(3) Deeper environments, down to 120 m, were collected by conventional dredging from a small boat.

Residues were immediately sieved in sea water (mesh 5 mm, 1 mm and 0·35 mm); the smaller fractions were placed in a bucket with plenty of sea water and observed for the small molluscs emerging. Living animals were observed, and drawings made of all the species.

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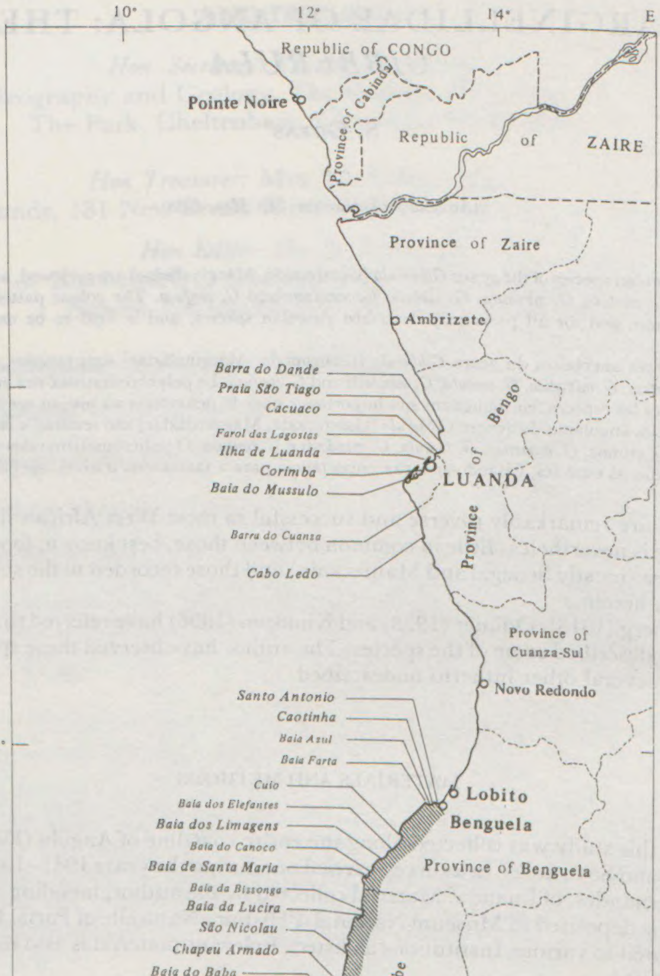


Fig. 1. Map of coastal Angola, to show localities of collecting; hatched area shows predominantly rocky shore. Scale: 1/8 000 000.

SYSTEMATIC PART

Generic features

The type species of *Gibberula* Swainson, 1840 is *G. zonata* Swainson (= *Volvaria oryza* Lamarck, 1822), the animal of which I have described elsewhere (Gofas, in press). The most closely allied representative in Angola is *G. cristata* n. sp.

Other genus-group names are available for small shells resembling *Gibberula*. These include *Granula* Jousseaume, 1875 (type species *Marginella bensoni* Reeve, 1865, subsequent designation by Coan, 1965) and *Kogomea* Habe, 1951 (type species *Erato novemprovincialis* Yokoyama, 1928 by original designation). They are distinguished from *Gibberula* only on smaller size and tenuous conchological grounds. The observations of living specimens of all species listed herein does not show any essential difference with the type species of *Gibberula*.

Shell characters

Shell 1·5 to 10 mm in length, ovoid, stout, with a small, low spire. Outer lip thickened but without external varix, usually denticulated inside. Columella with several plaits on a thickened rim, decreasing in size towards posterior end (differing in this respect from *Marginella* and *Hyalina* where the foremost plait is the smallest). Siphonal canal distinctly notched. Shell material colourless or with spiral lines or bands.

The outer lip of immature specimens is thin. In species where the adult has a denticulated aperture, this character may be seen on juvenile specimens, as spiral grooves deep inside the aperture but not reaching its margin.

Head/foot

The head of *Gibberula* is deeply divided in two. There are two short cephalic tentacles and two small anterior lobes. The eyes are a short distance behind the tentacles, somewhat laterally but not protruding as in *Marginella*. The mouth is provided with an extensible proboscis.

The foot is only slightly longer than the shell when extended. In some species, the sole lies flat on the substrate when the animal is crawling. Others have the edge of the propodium raised, developed as parapodia which fit the head/tentacles in the manner of many tectibranchs. This character is stable for a given species, the typical attitude is resumed as soon as the animal is moving. It may be related to ecological preference of the particular species, the latter morphology better fitted to motion on a soft substrate or within a sediment-infilled algal mat.

The colour pattern of the head/foot is a useful taxonomic character in all the species.

Mantle

The mantle of *Gibberula* does not extend over the shell during normal activity. A tongue shaped, translucent lobe may be seen on the left side in some instances.

The internal mantle is usually visible through the shell. It may be brightly coloured in the smaller species with a featureless, translucent shell, and its pattern is then continued into the spire over the visceral mass.

Mantle design is very stable in some species (e.g. *G. aurata*, *G. atlantidea*, *G. mimetica*) where it may be used as a taxonomic character; it is more unpredictable in others (e.g. *G. pallata*, *G. cristata*) where only basic colours are stable but not patterns. Similar colour pattern is found in closely related species, and interpreted as persistence of a common ancestral character in the local radiation.

The siphon is short and unconspicuous, often bordered by a small pad.

Radula

The teeth in the rachiglossate radula of *Gibberula* are strongly arched, and indented with strong cusps of which the most prominent is usually axial. There is much variability of the teeth along the same radula, and the detail in cusp morphology is seldom identical on two successive teeth.

Among the species examined, there is no correlation between shell size and size of radula teeth. The smallest teeth were seen in *G. gruveli*, a relatively large species.

An unusual pattern has been seen on one of the species examined (*Gibberula aurata*), where a regularly alternating morphology is developed between two successive teeth, in order to fit the exceedingly long lateral cusps (see Fig. 22).

Reproduction

All species of marginellids have a direct development without planktonic phase. Egg cases, containing a single developed embryo, have been observed for *G. atlantidea* and *G. gruveli*. The latter were attached to other shells, including shells and opercula of *Turritella praetermissa* Dautzenberg, 1913, on a muddy bottom in Bay of Mussulo, province of Luanda (Fig. 15).

Dwarf specimens

Smaller individuals, evidently adult judging from completely formed outer lip but about half the size of average individuals and constituting a discrete size class, were found together with populations of *G. pallata* and *G. mimetica*. No definitive character other than size could be reported, and the significance of these dwarf specimens is not known. Size range of other species seems rather stable within one area, whereas series of sibling species differing apparently only in size are documented for *Marginella*.

Gibberula cristata n. sp. (Figs. 2–5, 46–47)

Etymology: from Latin cristatus, a, um (adj.), provided with a crest (allusive to the raised suture).

Type locality: Bay of Corimba, Praia Etambar (province of Luanda) on infralittoral rocks lined with muddy algal mat, 0–1 m.

Type material: Holotype (MNHN) and 126 paratypes (86 adults and 40 juveniles) from the type locality (MNHN, BMNH, IIT, UAN, FF). 6 paratypes (MNHN): Dredging (10 m) between Cacuaco and Farol das Lagostas (prov. Luanda).

Other material examined

Northern Angola: Barra do Dande, on rocks 0–1 m: 15 adult specimens and 20 juveniles. Bay of Corimba, dredging 10–20 m on gravel: 4 specimens. Off Ilha de Luanda, dredging 40–50 m: 14 specimens.

Southern Angola: Caotinha, infralittoral rocks 0–1 m: 1 specimen. Bay of Santa Maria, dredging 8–10 m: 2 specimens. Bay of Lucira, infralittoral rocks 0–1 m: 12 specimens, and dredging 10–15 m on calcareous algae: 7 specimens.

Abbreviations used in the text

MNHN: Muséum National d'Histoire Naturelle, Paris – Laboratoire de Malacologie
BMNH: British Museum (Natural History), London
IIT: Instituto de Investigação Cientifica Tropical (Centro de Zoologia), Lisbon
SAM: South African Museum, Cape Town
UAN: Universidade Agostinho Neto (faculdade de Ciências, dep. Biologia), Luanda
FF: private collection of Francisco Fernandes, Luanda
'Specimens' refers to specimens collected alive, as opposed to 'shells'

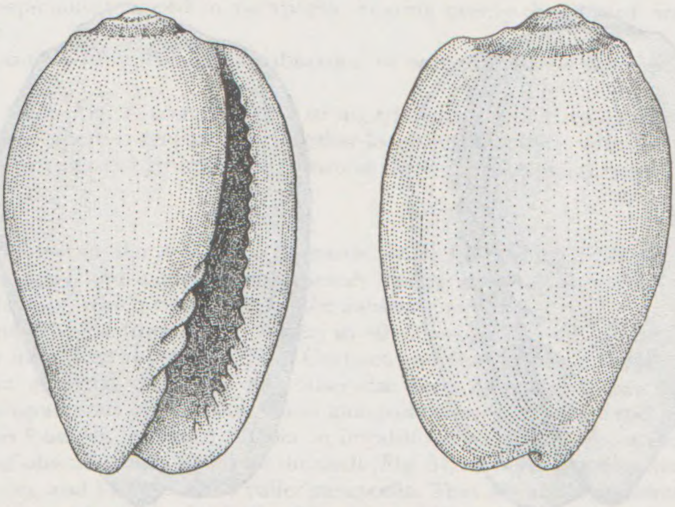


Fig. 2. *Gibberula cristata* n. sp.: holotype, from Praia Etambar. Actual size: 5·7 mm.

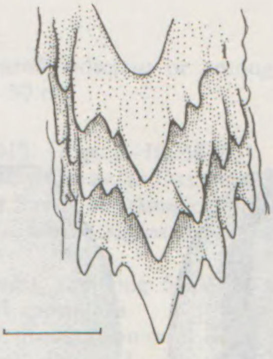


Fig. 3. *Gibberula cristata* n. sp.: same locality, three teeth of the radula; scale bar is 10 μm.

Description

Shell 5 to 7 mm in length, rather solid. Suture characteristically raised in a low spiral ridge. Outer lip thickened, very slightly protruding posteriorly, with some 20 definite denticles on the inner side. Columella with 5 to 6 plaits, evenly decreasing in size posteriorly. Shell translucent, whitish to orange or tan in colour, with a dark sutural band; the subsutural area and anterior part of body whorl are rather porcellaneous and opaque.

Head bearing two cylindrical tentacles and conspicuous anterior lobes; its profile is slightly swollen next to the eyes. Some orange and yellow spots are irregularly scattered on the head and tentacles; a greyish stain is occasionally present behind the eyes.

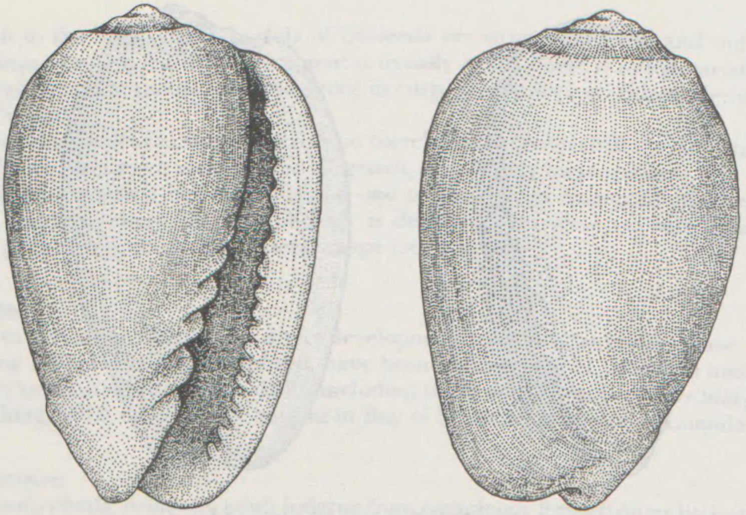


Fig. 4. *Gibberula cristata* n. sp.: specimen from off Ilha de Luanda, 50 m. Actual size: 6·2 mm.

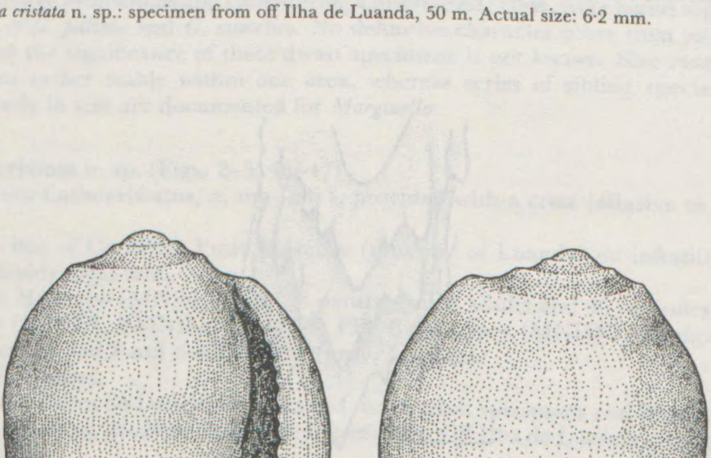


Fig. 5. *Gibberula cristata* n. sp.: specimen from Bay of Lucira (Praia do Cesar), dredging on calcareous algae 10 m, showing confuse banding on the shell. Actual size: 6.0 mm.

Foot conspicuously raised in parapodia, bearing evenly distributed orange and pale yellow spots.

Inner mantle with a variable combination of orange spots on dark grey and withish background.

Radular teeth (Fig. 3) arched, with a strong triangular axial cusp flanked by one or two small denticles. There is on each side another large cusp building with the central cusp a rather flattened tricuspid structure, then two or three smaller lateral cusps.

Remarks

This species is most similar to *G. oryza* (Lamarck, 1822), from which it differs conchologically by a broader spire and a more conspicuously raised suture. The animal differs by the attitude of the foot, which crawls flat on the substrate in *G. oryza.*

Specimens dredged from deeper water, in 40–50 m off Ilha de Luanda on rocks and gravel, differ from littoral populations of Cacuaco and Corimba by a deeper orange hue of the shell. No essential difference has otherwise been noted, and they are considered conspecific. Populations of *G. pallata* found alongside show the same trend in shell colour.

Specimens found in Southern Angola on infralittoral rocks differ from those of Luanda by presence of obscure spiral bands on the shell (Fig. 5), by burnt carmine stains on siphon and behind eyes, and by apparently stiffer parapodia. They are also considered conspecific.

Some specimens found in dredging of Lucira and Santa Maria are larger, with a more slender anterior part of shell. One of them, observed alive, has a predominantly burnt carmine siphon, and very scarce orange and burnt carmine dots on the foot, also raised in parapodia. Material seen is not sufficient to ascertain if these should represent another species.

Habitat

In algal mat with agglomerated sediment or among muddy gravel, usually on hard substrates, low water mark to 50 m.

Gibberula pallata (Bavay, 1913) (Figs. 6–10, 48–51)
Original reference: *Marginella pallata* Bavay, in Dautzenberg, 1913, p. 24, Pl. 1, figs. 27–28
Type locality: Praia Amelia and Bay of Moçâmedes, prov. Namibe
Type material: Figured specimen, here designated as lectotype, in MNHN
Other material examined
Northern Angola: Bay of Corimba, dredging 5–20 m: numerous specimens. Off Ilha de Luanda, dredging 40–50 m: 11 specimens.
Southern Angola: Santo Antonio, dredging on mud 10 m: numerous specimens. Bay of Santa Maria, beach 1 m: 5 specimens. Bay of Lucira, dredging 15–30 m in front of fisheries, numerous specimens. Santa Marta, dredging 40 m: 4 specimens. Praia Amelia, dredging 40–60 m: 16 specimens. Baia dos Tigres, dredging 5–6 m within bay: 15 specimens.

Description

Shell 4·5 to 6 mm, inflated posteriorly and narrowing anteriorly, with a distinctly conical, low spire. Suture flush. Outer lip with some 20 definite denticles. Shell material somewhat translucent, usually whitish with a dark sutural band and a brown spiral band to the anterior third. Some shells are plain white.

Head with pale yellow spots, some clusters of orange and dark brown spots, and a large brown area behind the eyes. There are also some pale yellow spots and an occasional orange spot on the tentacles.

Foot crawling flat, with a pattern of alternating pale yellow patches and clusters of

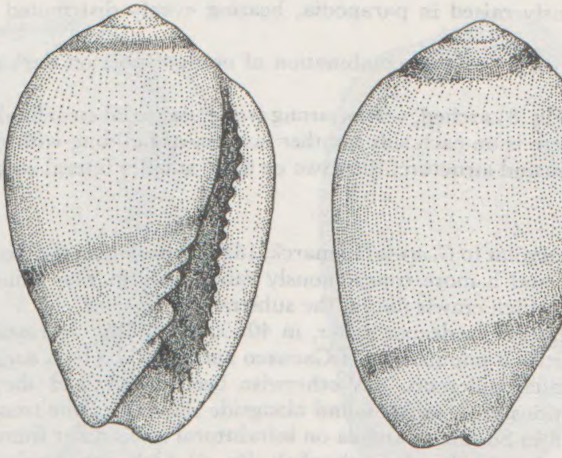


Fig. 6. *Gibberula pallata*: specimen from Bay of Corimba, 20 m. Actual size: 5·3 mm.

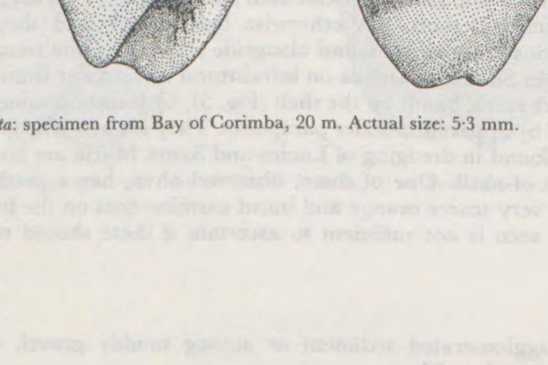


Fig. 7. *Gibberula pallata*: same locality, specimen with white shell. Actual size: 4·8 mm.

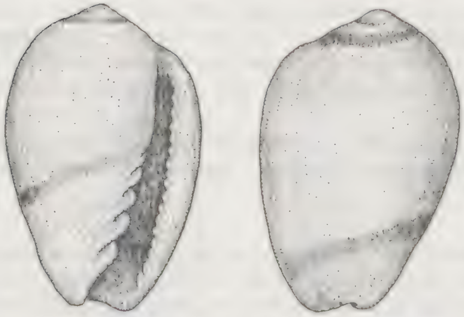


Fig. 8. *Gibberula pallata*: same locality, 'dwarf' specimen. Actual size: 3·7 mm.

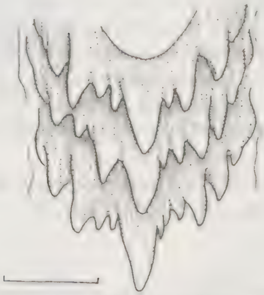


Fig. 9. *Gibberula pallata*: same locality, three teeth of the radula. Scale bar is 10 μm.

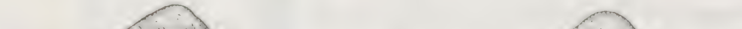


Fig. 10. *Gibberula pallata*: specimen from Baia dos Tigres, 5 m. Actual size: 6·5 mm.

orange and brown spots. The propodium has only pale yellow with some orange spots, whereas the axis of metapodium is occupied by a brown/orange cluster.

Inner mantle with a variable pattern of slate grey and whitish, the dark element usually dominant in individuals with coloured shells, and reduced to scattered spots in individuals with white shell.

Radular teeth (Fig. 9) arched, with a strong axial cusp flanked by one or two small cusps. On each side, there is then another prominent cusp and two other decreasing in size.

Remarks

There is a discrete variability in colour pattern of the shells, some being plain white (Fig. 7) and others with the characteristic bands. Colour patterns of the corresponding soft parts differ only by reducing melanism of the mantle (Fig. 49). No significant difference in habitat has been found for these phenotypes, which occur together wherever the species is found.

Numerous dwarfed individuals, hardly 3·5 mm in length but definitely adult with thickened outer lip (Fig. 8), have been found in a restricted area of Bay of Corimba, Luanda. Their polychromatism is similar to that of normal sized populations (Fig. 50), and normal sized individuals were found nearby. There is no argument for giving any taxonomic value to this difference, but their significance is not explained.

Specimens from deeper water, off Ilha de Luanda, 40–60 m, have a more intensely coloured shell, yellowish to pale orange. Colour pattern of the soft parts is not appreciably different.

Specimens from Baia dos Tigres (Fig. 10) are definitely larger than those from Benguela or Luanda, to the same extent as observed for *G. gruveli.*

Habitat

This species has been found on soft bottoms, usually muddy sand or gravel, in 5 to 50 m depth. It is usually common where present.

Gibberula gruveli (Bavay, 1913) (Figs. 11–17, 53–54)

Original reference: *Marginella gruveli* Bavay in Dautzenberg, 1913, pp. 24–26, Pl. 1, figs. 29–30.

Type locality (here designated): Moçâmedes. Other localities mentioned in the original reference: between Conakry and lighthouse of Boulbiné; wharf of Tamara; archipelago of Los; Estuary of Congo; Praia Amelia.

Type material: Figured specimen, here designated as lectotype, in MNHN.

Other material examined

(numerous specimens from all localities, unless otherwise stated):

Congo: Pointe Noire: 3 specimens (Office Pointe Noire).

Northern Angola: Bay of Bengo, facing Cacuaco, dredging in 3–5 m. Bay of Corimba, dredging 10–20 m. Innermost part of Bay of Mussulo, numerous specimens and egg capsules. Cabo Ledo, dredging in 5–10 m.

Southern Angola: Santo Antonio, near city of Benguela, dredging 10 m. Bay of Santa Maria, in 1–2 m: ca. 400 specimens. Bay of Lucira, dredging in 5–10 m facing fisheries. Bay of Lucira, (Bissonga), dredging in 5–20 m. Santa Marta, south of Lucira, dredging in 30–40 m: 7 shells. Bay of Moçâmedes, Mission Gruvel: 2 specimens. Bay of Moçâmedes, dredging in 10 m. Praia Amelia, dredging in 40–60 m facing fisheries. Pinda, near Porto Alexandre, facing mouth of Rio dos Flamingos, dredging in 10–20 m. Baia dos Tigres, inner shore of the sand bar, tidal flats: ca. 300 specimens.

Description

Shell 4 to 7 mm in length, oblong, with a bluntly rounded spire. Suture flush; obscured by

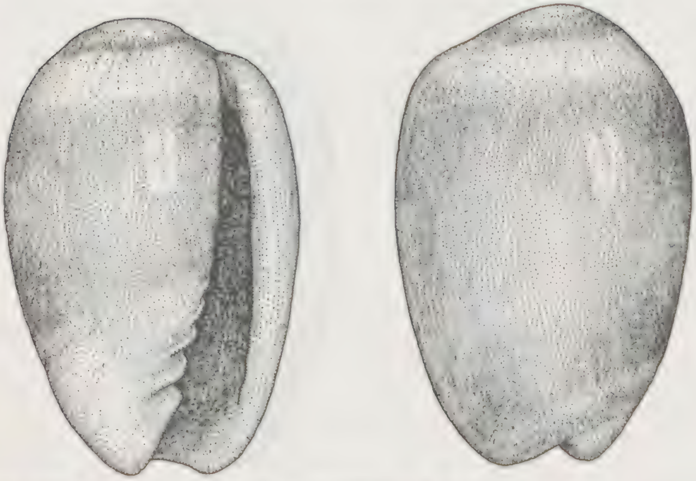


Fig. 11. *Gibberula gruveli*: specimen from Bay of Moçâmedes, 10 m. Actual size: 5·6 mm.

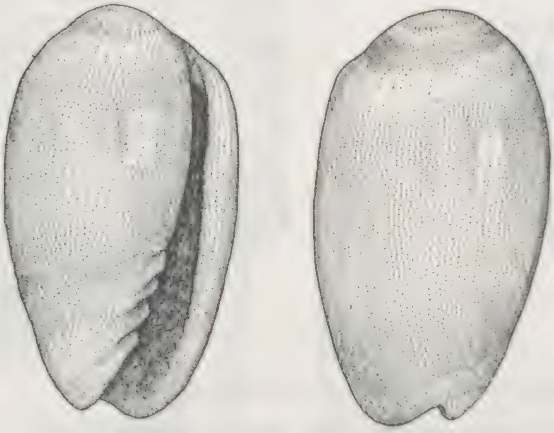


Fig. 12. *Gibberula gruveli*: specimen from Bay of Corimba, 10 m. Actual size: 5·0 mm.

glassy deposit. Outer lip usually smooth even in gerontic specimens; some very faint denticulations may occasionally be seen at some distance inside aperture. Columella with 4 to 5 plaits on a very thickened rim. Shell material rather translucent in the median part of body whorl, porcellaneous towards extremities. There is a dark brown sutural band and, on the median part of the body whorl, two blurred spiral bands of pale brown, often indistinct, separated by a slightly paler zone or merging together.

Head rather small, bearing two cylindrical tentacles and small, tapering anterior lobes. There is a burnt carmine area around the eyes, and some yellow on tentacles and lobes.

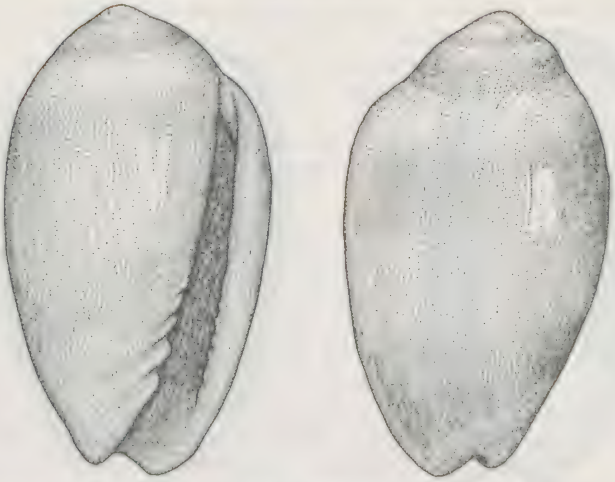
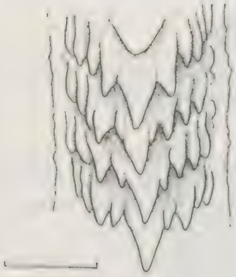


Fig. 13. *Gibberula gruveli*: same locality, specimen with higher spire. Actual size: 5·8 mm.



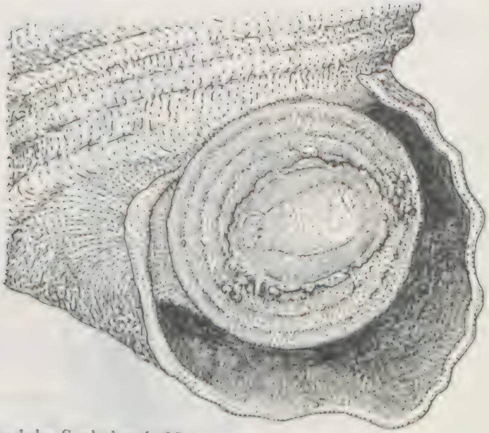


Fig. 14. *Gibberula gruveli*: same locality, four teeth of the radula. Scale bar is 10 μm.

Fig. 15. *Gibberula gruveli*: egg capsule with single embryo on the operculum of a *Turritella*; bay of Mussulo, dredged 10 m.

Foot broad and ovate in outline, conspicuously raised in parapodia, colourless with only some opaque white patches increasing in size towards metapodium; occasionally, some burnt carmine spots are also present. The siphon is small, with a burnt carmine band and yellow patches. It is bordered by a distinct pad, of the same colour.

The inner mantle is not very apparent through the shell; it has a variable pattern of dark grey reticulation and pale areas.

Radular teeth (Fig. 14) arched, with a very prominent, triangular axial cusp, and four other smaller cusps on each side; the cusps next to the axial are strong on some teeth, reduced on others in which case it is the next one which is well developed.

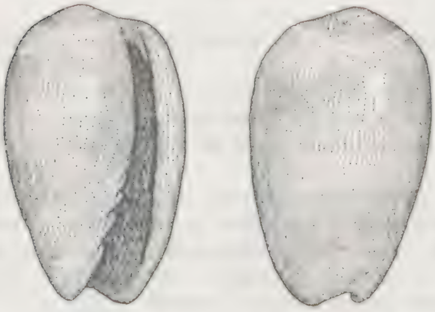


Fig. 16. *Gibberula gruveli*: specimen from Pointe Noire, Congo. Actual size 3.7 mm.

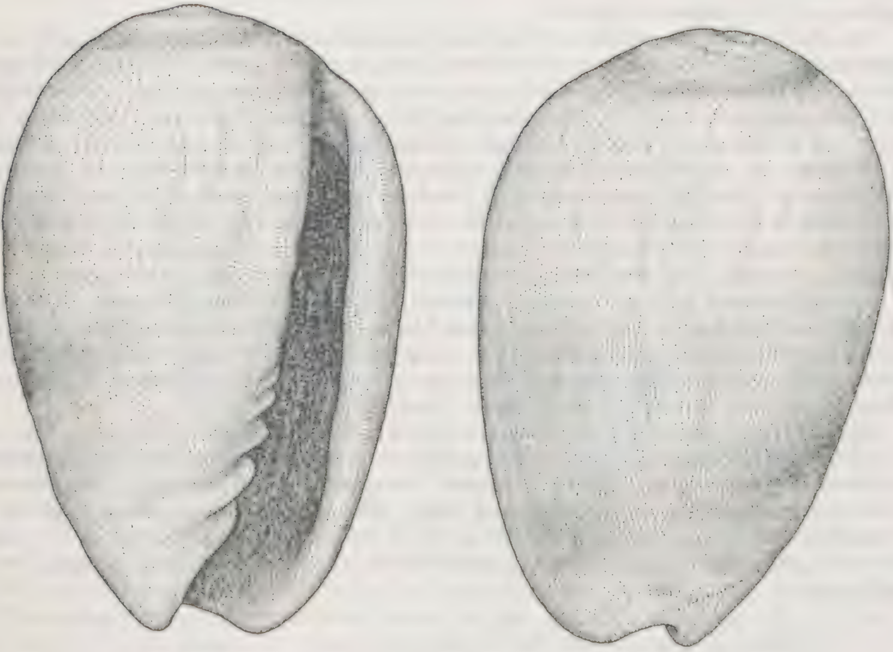


Fig. 17. *Gibberula gruveli*: specimen from Baia dos Tigres, tidal flat. Actual size: 7·0 mm.

Remarks

The angle of spire can vary considerably among specimens from the same locality (Figs. 12, 13).

There is a definite clinal variation in adult size, from hardly 4 mm in Congo (Fig. 16) to 5–6 mm around Luanda and more than 7 mm at Baia dos Tigres (Fig. 17). Specimens from Baia dos Tigres show a more intense band on anterior part of shell (see discussion of *G. benguelensis*).

Conchologically, *G. gruveli* is most closely allied to *Gibberula chudeaui* (Dautzenberg, 1910). The latter is distinguished by colour pattern of 3–5 narrow spiral bands evenly distributed on body whorl, by regularly fusiform profile, not inflated posteriorly, by outer lip denticulated inside and projecting posteriorly. Mention of *G. chudeaui* at Moçâmedes by Dautzenberg (1913) should be referred to *G. gruveli*.

Habitat

This species is found on soft bottoms, mostly on mud or muddy sand. It is locally very abundant to the point of being a major component of the molluscan fauna.

There is a shift in the upper bathymetric limit, from North to South. In the Luanda area, *G. gruveli* is found in 5 to 20 m water depth; it has been collected by hand-dredging very close to the beach in 1–2 m at Santa Maria and Lucira, and has been found intertidally on muddy tidal flats at Baia dos Tigres.

Gibberula benguelensis Jousseaume, 1875 (Fig. 18)
Original reference: *Gibberula Benguelensis* Jousseaume, 1875, pp. 82–83, Pl. 8, fig. 8.
Type locality: 'Benguela'
Type material: 13 syntypes in MNHN

The syntypes of *G. benguelensis* are beachworn specimens of rather large size (7 mm), with a gross morphology similar to that found in the population of *G. gruveli* from Baia dos Tigres. The inner lip shows distinct denticulation on certain specimens. Colour pattern of the shell is faded, but some show a blurred spiral band on the anterior part of the last whorl. Thus, the syntypes of *G. benguelensis* display a mosaic of characters of both *G. gruveli* and *G. pallata*.

The large size of specimens denotes a very southern origin, possibly Baia dos Tigres or further south in Namibia. Specimens of *G. gruveli* and *G. pallata* observed at Santo Antonio, near Benguela, are small and translucent like those of Luanda area. Thus, the type locality 'Benguela' stated by Jousseaume (1875) must be understood as designating the country (as opposed to 'Congo') and not the city or province of Benguela in the modern sense.

A few specimens with ambiguous characters of both above named species, have been seen in the area of Lucira (Fig. 19) and Santa Maria. These are of comparable size to local populations of *G. gruveli* and *G. pallata*. Their gross shape is that of *G. gruveli*, but they lack the definite glassy deposit on the spire and display an anterior spiral band on the shell as does *G. pallata*. Some show definite denticulation on inner lip.

One such specimen from Santa Marta, dredged in 40 m sandy gravel, has been observed alive (Fig. 52). Its colour pattern recalls *G. pallata* with brown, yellow and orange on the foot, but clusters of brown/orange spots are replaced by irregular brown areas and orange dots are rather concentrated on propodium and head. The propodium is raised laterally in parapodia, a character which never occurs in *G. pallata* and is conspicous in *G. gruveli*. Typical *G. pallata* (alive) and shells of *G. gruveli* have been found in the same dredging, but in small number.

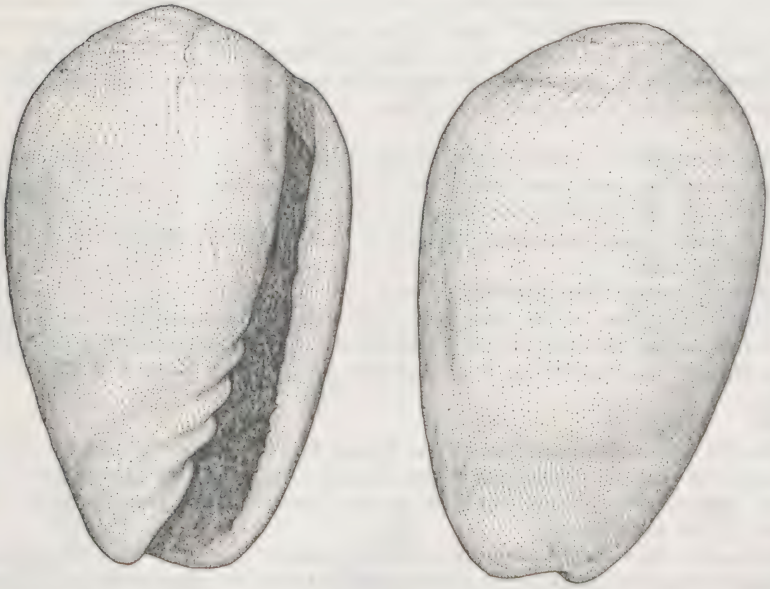


Fig. 18. *Gibberula benguelensis*: syntype. Actual size: 6·8 mm.

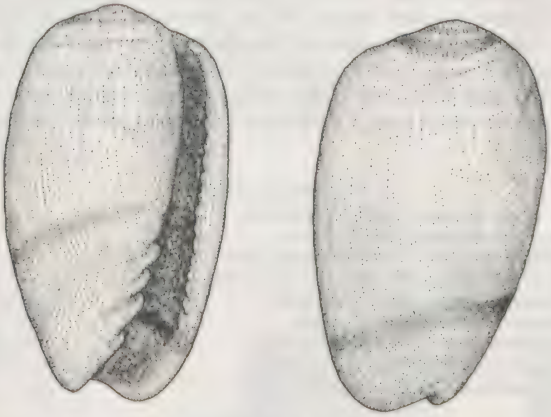


Fig. 19. *Gibberula* sp.: specimen from off Santa Marta, 40 m. Actual size: 4·9 mm.

Such spurious specimens did not occur in localities where *G. pallata* and *G. gruveli* were found abundant and sympatric in their normal habitat, and where hundreds of unequivocal specimens could be examined. It may be suggested that these ambiguous specimens result from hybridization, occurring in marginal habitats where normal mating becomes problematic.

It has been considered preferable, for the stability of nomenclature, to maintain the clearly defined taxa *G. gruveli* and *G. pallata* and reserve the name *G. benguelensis* (despite its priority) for the ambiguous specimens as discussed above. If proved to be based on hybrid specimens, the name *G. benguelensis* should not be used for either species (art. 23 h of the International Code for Zoological Nomenclature).

Gibberula aurata (Bavay, 1913) (Figs. 20–22, 56–57)
Original reference: *Marginella aurata* Bavay, in Dautzenberg, 1913, p. 26, Pl. 1, figs. 33–34
Type locality: dredging in Bay of Moçâmedes, 15–20 m
Type material: figured specimen, here designated as lectotype, in MNHN
Other material examined:
(numerous specimens unless otherwise stated)
Southern Angola: Caotinha, 0–1 m. Baia Azul, 0–1. Baia dos Limagens, 0–2 m. Baia de Santa Maria, 0–1 m. Lucira (Cesar), 0–1 m: 4 specimens. Chapeu Armado, 0–1 m: 2 specimens. Praia Amelia, 0–1 m: 1 specimen. Praia Amelia, dredging 40–50 m: 4 shells.

Description

Shell 2·5 to 2·9 mm in length, 1·5 to 1·8 mm broad. Spire moderately low, not concealed by body whorl; the distinct embryonic whorl gives it a mammillate appearance. Outer lip thickened, with 16–18 definite denticles on the inner side. Columella with 5–6 plaits decreasing in size posteriorly.

Shell translucent except for anterior callosity, tawny in colour with two difuse darker spiral bands on the median part of body whorl and a third, less distinct band anteriorly, next to the opaque anterior callus. The internal suture and soft parts are distinctly seen by transparency.

Head and foot with a colourful pattern of dark green (grading to black in some populations), bright orange and pale yellow. There is usually a dark green blotch in front of the eyes and another one at mid length of the tentacles. The foot has a pale yellow background, with a loose reticulate pattern of the dark green enclosing the orange blotches.

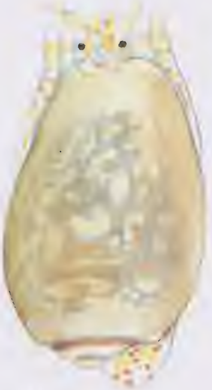
Inner mantle distinctly seen, most colourful with a median zone of bright orange with rounded spots of green with a narrow black margin. This zone is bordered anteriorly and posteriorly by two zones of black with a scalloped pattern of opaque white loops, each white

COLOUR PLATE 1

Fig. 46. *Gibberula cristata* n. sp.: specimen for Praia Etambar.
Fig. 47. *Gibberula cristata* n. sp.: specimen from Cacuaco.
Fig. 48. *Gibberula pallata*: specimen from Bay of Corimba, 20 m.
Fig. 49. *Gibberula pallata*: same locality, specimen with white shell.
Fig. 50. *Gibberula pallata*: same locality, 'dwarf' specimen.
Fig. 51. *Gibberula pallata*: specimen from bay of Lucira.
Fig. 52. *Gibberula* sp.: specimen from off Santa Marta, 40 m.
Fig. 53. *Gibberula gruveli*: specimen from Cacuaco, 5–10 m
Fig. 54. *Gibberula gruveli*: specimen from bay of Lucira, 20 m.

COLOUR PLATE 2

Fig. 55. *Gibberula atlantidea*: specimen from off Ilha de Luanda, 90 m.
Fig. 56. *Gibberula aurata*: specimen from bay of Limagens, 0–2 m.
Fig. 57. *Gibberula aurata*: specimen from bay of Lucira (praia do Cesar).
Fig. 58. *Gibberula mimetica* n. sp.: 'dwarf' specimens from Chapeu Armado.
Fig. 59. *Gibberula mimetica*: same locality, specimen of normal size.
Fig. 60. *Gibberula tantula* n. sp.: specimen from Chapeu Armado.
Fig. 61. *Gibberula confusa* n. sp.: specimen from Praia Etambar.
Fig. 62. *Gibberula mendacis* n. sp.: specimen from Bay of Corimba, 20 m.
Fig. 63. *Gibberula columnella*: specimen from Praia Amelia, rocks 2–5 m.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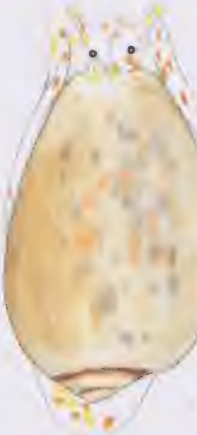
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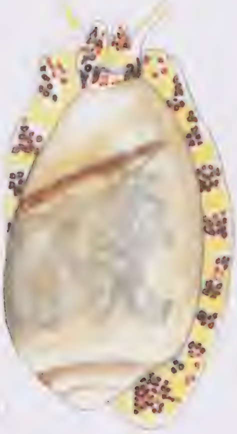
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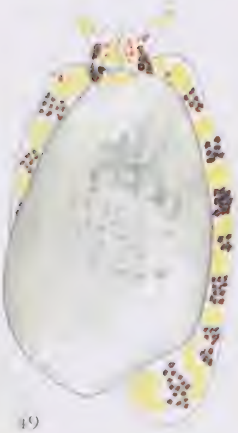
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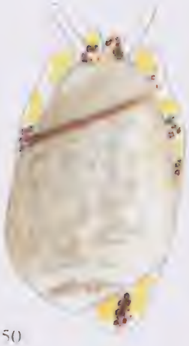
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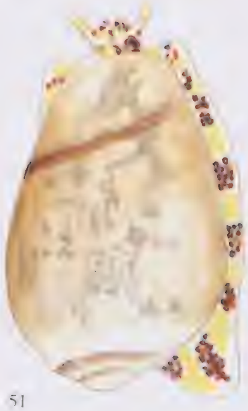
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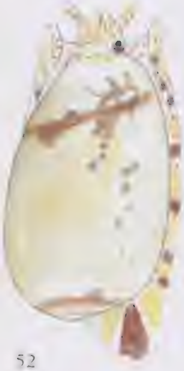
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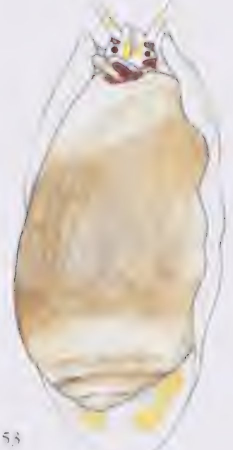
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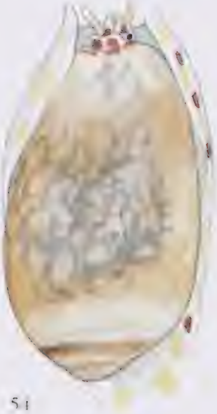
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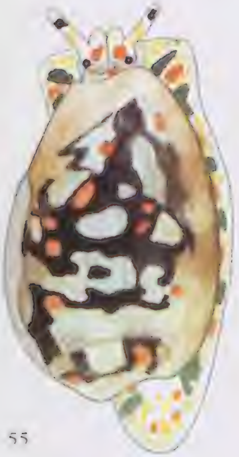
PLATE 1



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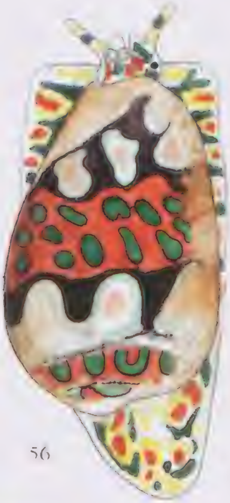

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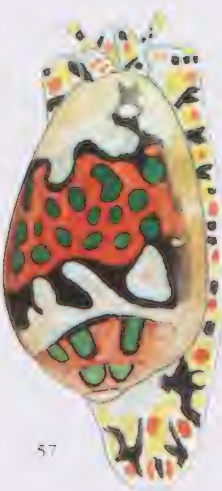

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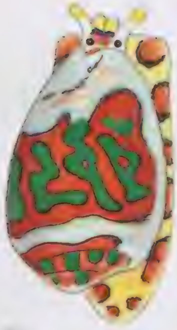

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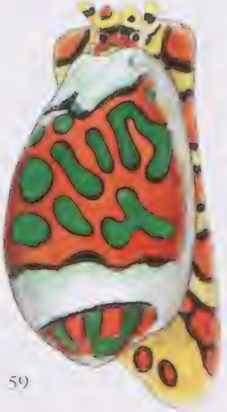

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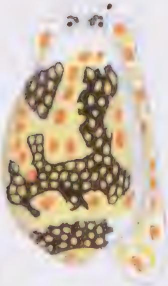

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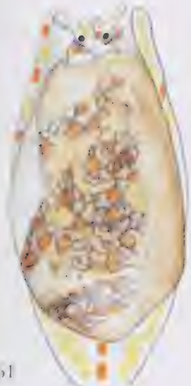

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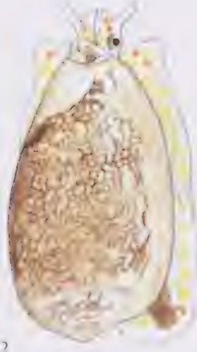

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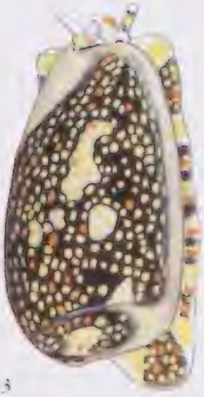

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PLATE 2

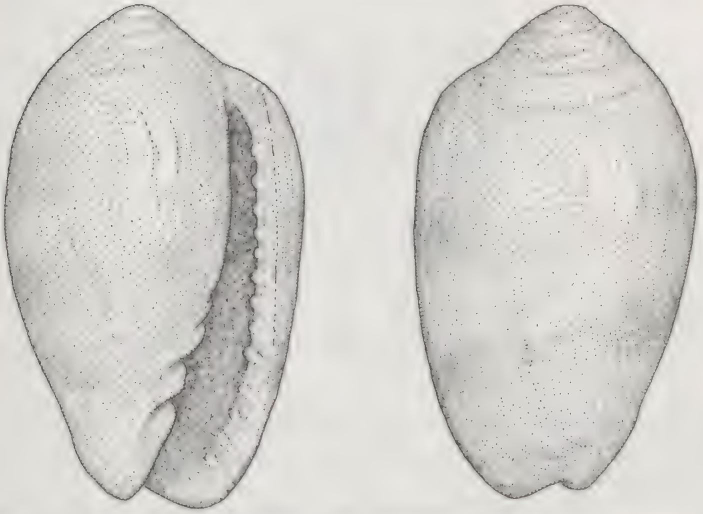


Fig. 20. *Gibberula aurata*: specimen from Santa Maria, infralittoral rocks 0–2 m Actual size: 3·0 mm.

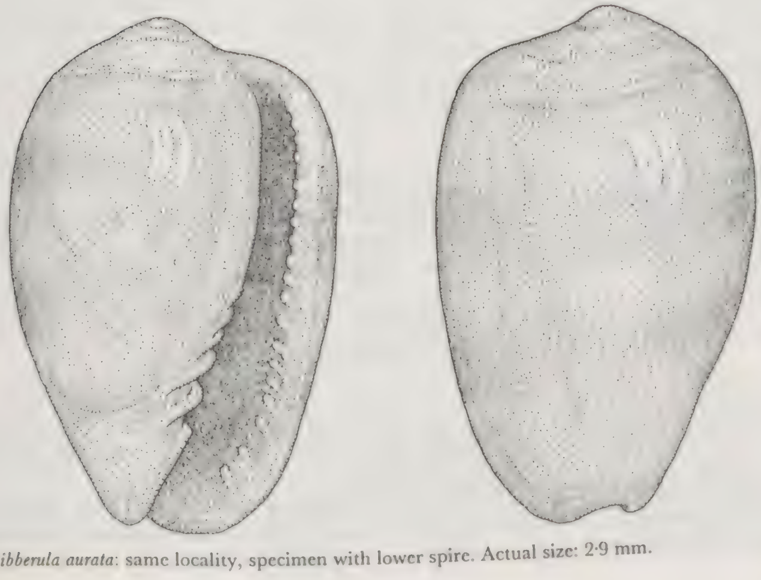


Fig. 21. *Gibberula aurata*: same locality, specimen with lower spire. Actual size: 2·9 mm.

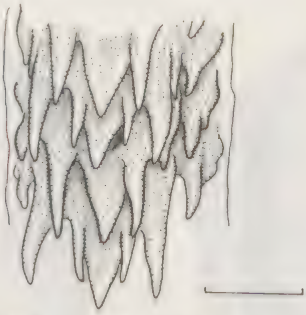


Fig. 22. *Gibberula aurata*: same locality, four teeth of the radula, to show the alternating morphology. Scale bar is 10 μm.

area bearing a pale stain of orange and green. The pattern is continued into the spire, with green loops margined of black, on an orange background. The siphon is short, tinged with green and orange spots.

Radular teeth (Fig. 22) with a depressed axial triangular cusp. The cusps next to it are extremely long and pointed in one of every two teeth; in every other tooth, these are reduced and it is the second cusp next to the central which is extremely developed. Next to this structure, there is a smaller cusp on the outer side.

Remarks

The pattern of foot is dark green in populations from Caotinha and Limagens (province of Benguela) (Fig. 56), rather black in populations from Lucira and Chapeu Armado (Fig. 57).

Habitat

This species has been found in a shallow infralittoral algal mat, on rocky bottom in moderately sheltered places. It is likely that the shells of type locality, as well as our shells from Praia Amelia 40–50 m, are displaced from shallow water.

G. aurata is common in the infralittoral of Benguela province. It is more occasional in Namibe province, where populations of *G. miniata* n.sp. are overwhelming in a similar environment.

Gibberula atlantidea (Knudsen, 1956) (Figs. 23–26, 55)

Original reference: *Marginella atlantidea* Knudsen, 1956, pp. 82–83, Pl. 1, fig. 3
Type locality: Atlantide st. 137, shore north of Luanda, hand collected.
Type material: Holotype, Zoologisk Museum Copenhagen.
Other material examined
Off Ilha de Luanda, in 90 m depth, 16 specimens; Off Ilha de Luanda in 50 m depth, 2 specimens. Off Bay of Lucira, in 90–100 m depth, 1 specimen.

Description

Shell up to 2·8 × 1·7 mm, with a small, low spire, not concealed by body whorl. Outer lip thickened, slightly projecting posteriorly, with some 15 denticles on the inner side. Columella with 5–6 plaits, decreasing posteriorly.

Shell translucent except for anterior callosity, tawny in colour. There are two very indistinct spiral bands which can be seen only on the outer lip. Internal suture, soft parts and prolongation of labial denticles are clearly seen by transparency.

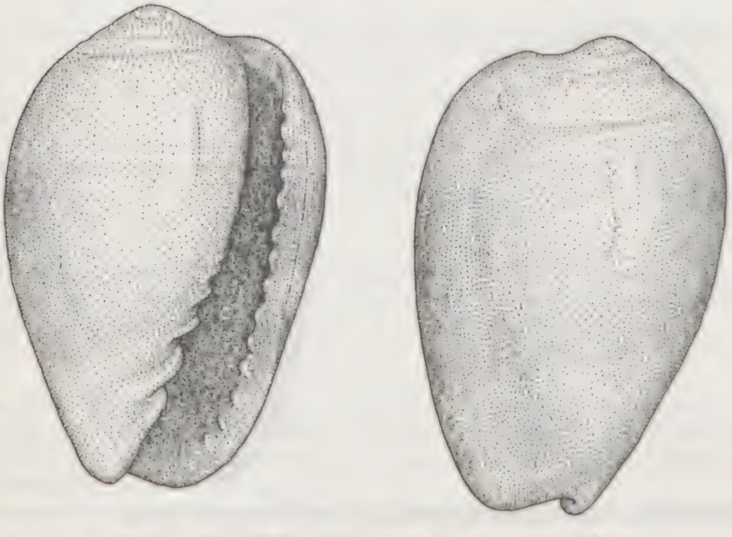
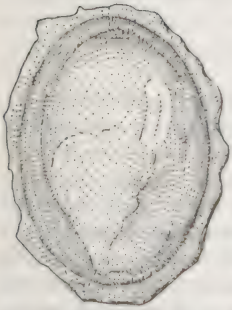


Fig. 23. *Gibberula atlantidea*: specimen from off Ilha de Luanda, 90 m. Actual size: 2·8 mm.



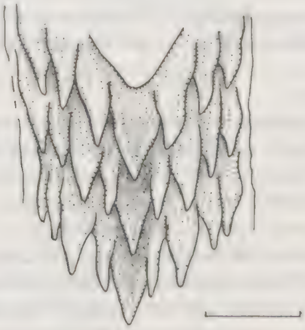


Fig. 24. *Gibberula atlantidea*: same locality, egg capsule. actual size: 1·1 mm.

Fig. 25. *Gibberula atlantidea*: same locality, three teeth of the radula. Scale bar is 10 μm.

Head and foot with a pattern of dark green, pale yellow and orange. There is usually a large dark green area behind the eyes, an orange spot in front of them, and some yellow or dark spots on the tentacles. The foot is bordered by alternating dark green areas and clusters of yellow and orange blotches.

The internal mantle is covered with a blackish, amoeboid pattern with few large orange spots, on a pale greenish background. A lobe of external mantle, translucent, has been seen extended on the left side of a specimen. The siphon is short, tinged with dark green and orange .

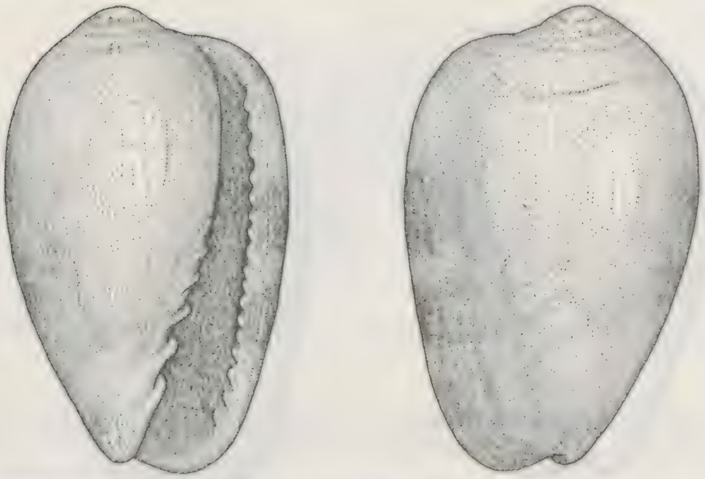


Fig. 26. *Gibberula atlantidea*: specimen from Bay of Lucira, 100 m. Actual size: 2·8 mm.

Radular teeth (Fig. 25) with a depressed triangular axial cusp, and three or four smaller cusps on each side. The cusps next to the axial are strong and raised on some teeth, reduced on others in which case it is the next one which is well developed.

Remarks

Our specimens completely agree with the original description, except for the fact that type locality is an intertidal station off Luanda (Atlantide st. 137), whereas all our specimens come from rather deep circalittoral zone.

Surveys of the coastline North of Luanda, from Ponta das Lagostas to Cacuaco, did not yield any species comparable to *G. atlantidea*. Atlantide St. 137 has been hand collected (Knudsen, in litt.) and only yielded, apart from the holotype of *G. atlantidea*, some large *Thais* and *Chicoreus gubbi*, both also found by the author. Conversely, Atlantide st. 136 is a dredging on the rocky plateau facing Ilha de Luanda, in 42–45 m, close to the place where our specimens were found. On these grounds, a mislabeling of the holotype is considered likely.

The holotype of *G. atlantidea* is presently badly damaged by acidic alcohol. The shell has lost transparency, colour pattern and shows signs of desquamation.

G. atlantidea is difficult to distinguish from *G. aurata* on the basis of the shell only. It differs by a more uniformly tawny colour, less distinct spiral bands which are seen only on the outer lip, lower spire and distinct notch at posterior insertion of outer lip.

It is readily distinguished by the colour pattern of the mantle, characteristic in either species although obviously derived from the same stock. *G. atlantidea* and *G. aurata* have been found sympatric at Lucira, each one within its characteristic depth zone.

An egg capsule with a well developed embryo, presumed to be conspecific from observation of the enclosed larval shell, has been collected with the specimens off Ilha de Luanda (Fig. 24).

Habitat
G. atlantidea is a deep circalittoral species, found in 50 to 100 m depth on hard bottoms where *Dendrophyllia ramea* corals are developed.

Gibberula mimetica n.sp. (Figs. 27–32, 58–59)
Etymology: from latin mimeticus, a, um (adj.), 'imitator' [of the colour pattern of *G. aurata*]
Type locality: Chapeu Armado, province of Namibe, infralittoral 0–1 m.
Type material: Holotype (MNHN), 44 paratypes kept dry (MNHN, BMNH, IIT, UAN, FF) and 19 paratypes in alcohol (MNHN).
Other material examined
Souther Angola: Baia das Pipas, tidal pools, 7 specimens. Praia das Conchas, by Moçâmedes, 3 specimens. Chapeu Armado, numerous specimens including juveniles. Bay of Santa Maria, 5 specimens. Baia dos Limagens, 1 specimen.

Description
Shell up to 2·6 × 1·5 mm (holotype: 2·5 × 1·4 mm), with a moderately low, small spire. Outer lip with about 14–15 definite denticles inside. Columella with 5–6 plaits decreasing posteriorly in size. Profile of body whorl somewhat tapering anteriorly, often with a slight depression bordering anterior callus.

Shell translucent except for anterior callus, hyaline and colourless. Internal suture and soft parts are clearly visible through the shell.

Head/foot brightly coloured of orange, black and yellow in the type locality, of orange, black and green elsewhere. The head has black solid lines in front of the eyes, across each tentacle and on anterior lobules, these separating orange and yellow (or green) areas. The foot has a similar pattern of thick black lines separating orange and yellow (or green) areas.

Internal mantle very brightly coloured. There is a broad median band, with round, amoeboid or vermiculated green areas bordered with black, on a bright orange background. This zone is bordered anteriorly and posteriorly by a thick wavy black line and opaque white zone vaguely tinged with green or orange. The pattern is continued into the spire by definite sectors of green and orange separated by solid black lines. Siphon tinged of orange and black.

Radular teeth (Fig. 31) with a depressed, rather short, triangular axial cusp, flanked with one or two small denticles. On each side, there is a stout, raised cusp and then two other smaller cusps on each side.

Remarks
The mantle pattern of *G. mimetica* n. sp. is similar to that of *G. aurata*, for which it may be mistaken at the first glance. It is distinguished by a broader central orange/green band, and by the pale whitish anterior and subsutural areas more continuous, wavy, not definitely scalopped as in *G. aurata*. The green designs in the central band are usually contorted, not rounded or ovate. The foot is distinctive with black separations between green (or yellow) and orange areas, which do not exist in *G. aurata*. The shell is anyway readily distinguished, being smaller, more slender and completely hyaline.

All specimens seen at Chapeu Armado (Figs. 58, 59) have an orange, black and yellow foot and head, whereas specimens collected further south at Baia das Pipas and Praia das Conchas are orange, black and green. The mantle areas are consistently green in any case.

A sinistral specimen was collected at Chapeu Armado (Fig. 29).

Several dwarfed specimens (1.5 × 0.9 mm) (Fig. 30) were collected at Chapeu Armado, not differing otherwise from the remainder of the population. These cannot be distinguished, conchologically, from *G. tantula*.

All specimens from Limagens and Santa Maria, tentatively referred to this species, are

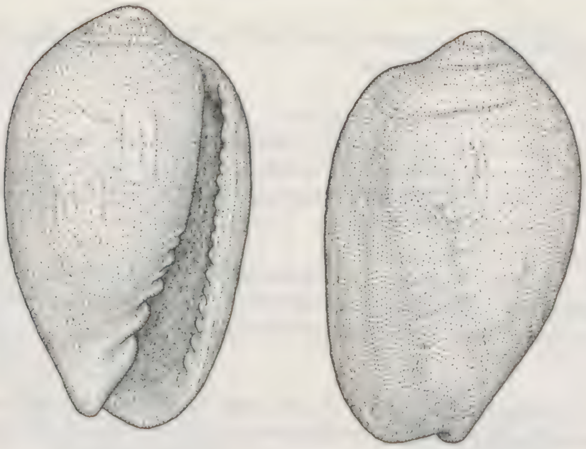


Fig. 27. *Gibberula mimetica* n. sp.: holotype from Chapeu Armado. Actual size: 2·5 mm.

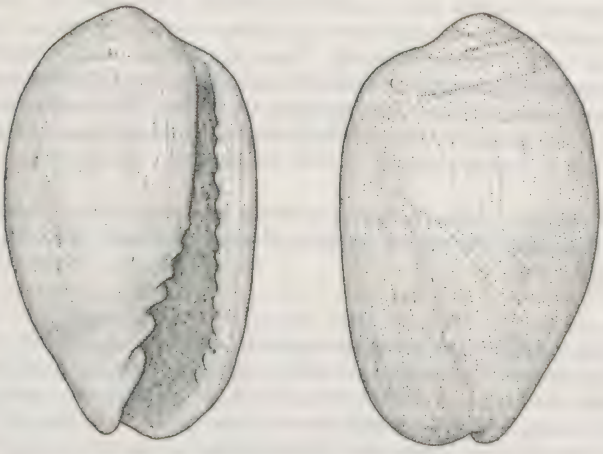


Fig. 28. *Gibberula mimetica* n. sp.: paratype, same locality. Actual size: 2·5 mm.

within the size of *G. tantula*. There were not enough adequately observed specimens to decide of their taxonomic treatment. The species is surprisingly absent from Bay of Lucira, in an apparently favourable environment.

Habitat

Within algal mat with agglutinated sediment in moderately exposed infralittoral localities, also in larger tidal pools.

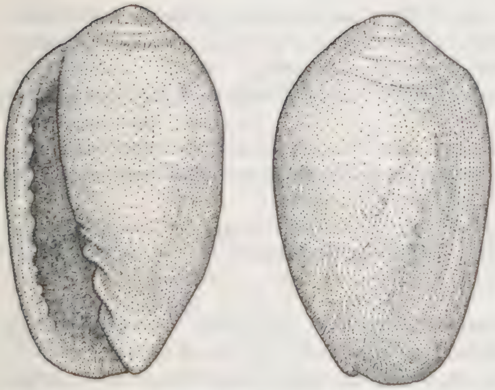


Fig. 29. *Gibberula mimetica* n. sp.: same locality, sinistral specimen. Actual size: 2·1 mm.

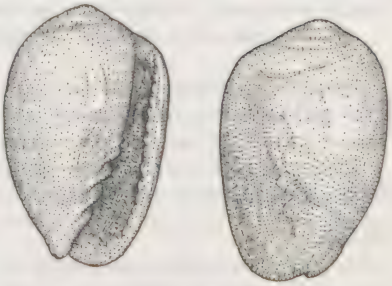


Fig. 30. *Gibberula mimetica* n. sp.: same locality, 'dwarf' specimen. Actual size: 1·5 mm.

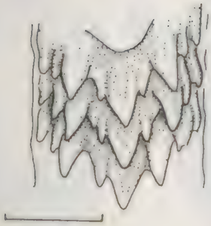


Fig. 31. *Gibberula mimetica* n. sp.: same locality, three teeth of the radula. Scale bar is 10 μm.

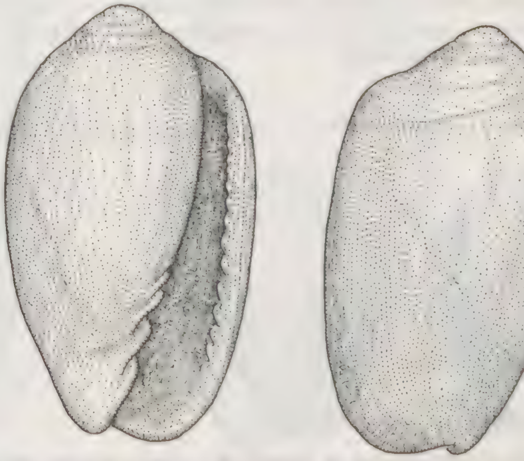


Fig. 32. *Gibberula mimetica* n. sp.: specimen from Praia das Conchas, tidal pools. Actual size 2·6 mm.

Gibberula tantula n.sp. (Figs. 33–35, 60)
Etymology: from latin tantulus, a, um: 'so small'.
Type locality: Chapeu Armado, province of Namibe.
Type material: Holotype (MNHN), 66 paratypes kept dry (MNHN, BMNH, IIT, UAN, FF) and 9 paratypes in alcohol (MNHN).
Other material examined
Southern Angola: Praia Amelia, 10 specimens. Baia das Pipas: 1 specimen. Baia de Santa Maria, numerous specimens.

Description
Shell up to 1.6 × 0.9 mm (dimension of holotype), with a moderately low spire. Outer lip

thickened, with internally a dozen poorly defined denticles reaching quite far inside the aperture. Columella with four plaits, the foremost distinctly stronger, the others decreasing in size posteriorly. Profile of body whorl rather tapering anteriorly.

Shell translucent, hyaline. Internal sutures and soft parts clearly visible through the shell.

Head with a cluster of brown spots around the eyes, elsewhere with pale yellow spots. The cephalic tentacles are small, rather club shaped and flattened and bear occasionally a brown spot. The foot has alternating orange and pale yellow spots.

Inner mantle with large irregular areas of brownish black with small yellow spots, and pale yellow areas with large bright orange spots. Siphon pale yellow.

Remarks

This species is readily recognized by the colour pattern of the soft parts, which resembles that of *G. columnella*. Otherwise, shells cannot be distinguished from dwarf specimens of *G. mimetica* n.sp. (although a clue may be given by the strong foremost columellar plait). A series of specimens from Limagens, which were not observed for colour patterns when alive, possibly belong to this species but their identity cannot be ascertained.

Shells from Corimba, near Luanda, have been found to resemble this species. This occurrence is confusing, as neither this species nor any other similar has been found alive in Northern Angola. These may possibly be subfossil material, as are most of dead shells found within Bay of Mussulo.

Habitat

Like the previous species, in infralittoral algal mat with agglutinated sediment.

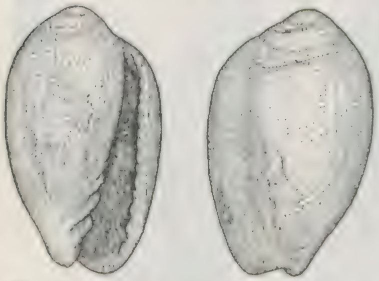


Fig. 33. *Gibberula tantula* n. sp.: holotype from Chapeu Armado. Actual size: 1·6 mm.

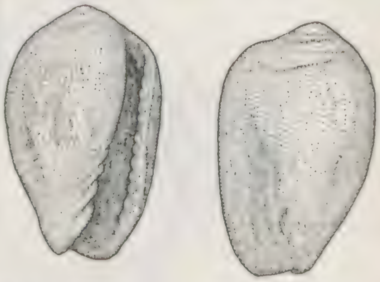


Fig. 34. *Gibberula tantula* n. sp.: paratype, same locality. Actual size: 1·5 mm.

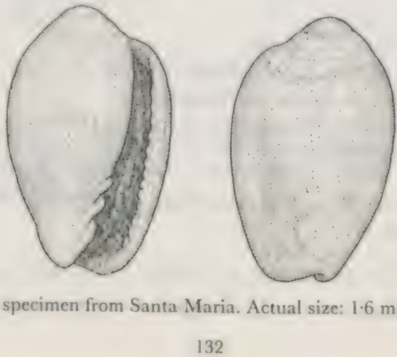


Fig. 35. *Gibberula tantula* n. sp.: specimen from Santa Maria. Actual size: 1·6 mm.

Gibberula columnella (Bavay, 1913) (Figs. 36–37, 63)
Original reference: *Marginella columnella* Bavay, in Dautzenberg, 1913, p. 26, Pl. 1, figs. 31–32.
Type locality: Praia Amelia (prov. Namibe), dredged in 15–35 m.
Type material: Holotype (figured in Dautzenberg, 1913) in MNHN.
Other material examined
Southern Angola: Praia Amelia, 3–5 m: 18 specimens and 6 shells. Santa Marta, dredging 40 m: 23 shells. Bay of Lucira (Bissonga), 1 m: 1 shell.

Description
Shell up to 3 × 1·5 mm, subcylindrical in shape, with a low spire. Outer lip thickened, smooth inside or with poorly defined denticles. Columella with three plaits, of which the two anterior are most distinct.

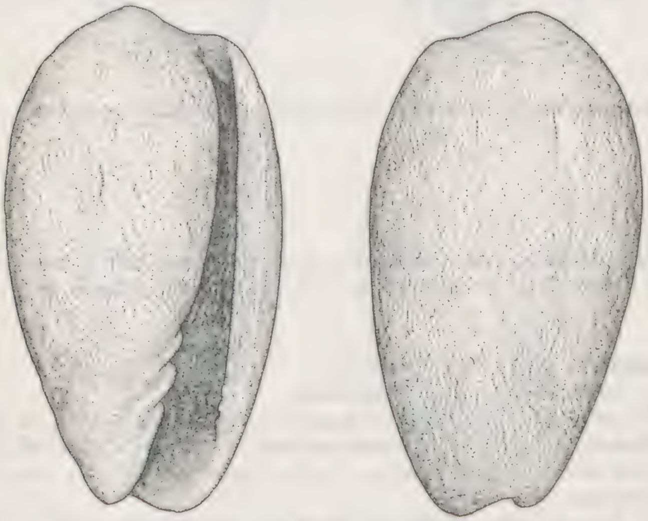


Fig. 36. *Gibberula columnella*: holotype from Praia Amelia. Actual size: 3·0 mm.

Shell translucent, hyaline. Internal sutures and soft parts clearly seen by transparency.

Head and foot coloured orange, yellow and black. The foot has alternating areas of yellow, and of black with yellow and orange spots; one large such black area covers axially the metapodium. The foot has not been seen to raise as parapodia.

Internal mantle mostly black, mixed with pale areas, entirely covered with numerous yellow spots and some orange spots. The same pattern extends to the siphon.

Remarks
This description is based on a living specimen observed close to the type locality, and conchologically compared to the holotype (here refigured, Fig. 36).

The list of observed occurrences is very conservative, as there are several similar species related to *Gibberula columnella*. Two new taxa (*G. mendacis* n. sp. and *G. confusa* n. sp.) observed on numerous living specimens, are introduced herein. Some shells which most probably

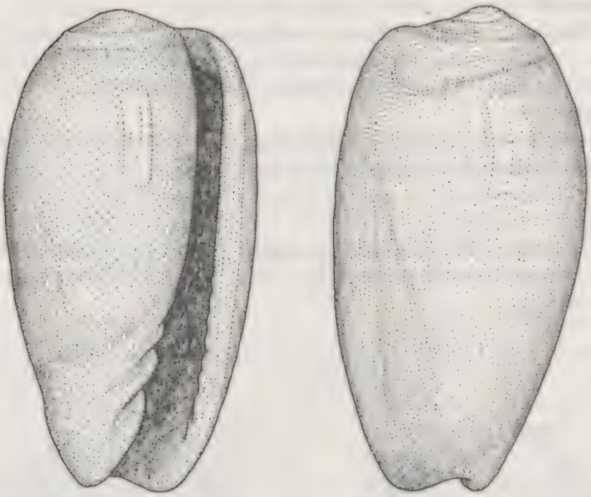


Fig. 37. *Gibberula columnella*: specimen from Praia Amelia, rocks 2–5 m. Actual size 2·7 mm.

represent additional species are illustrated and described, but it has been considered inadequate to name them before they can be consistently defined with data on living animals.

Gibberula mendacis n.sp. (Figs. 38–40, 62)
Etymology: from Latin mendax, acis, 'misleading'.
Type locality: Bay of Corimba (province of Luanda), dredging 15–20 m on shell gravel.
Type material: Holotype (MNHN), 31 paratypes kept dry (MNHN, BMNH, IIT, UAN, FF) and 25 paratypes in alcohol (MNHN).
Other material examined
Southern Angola: Bay of Lucira (Bissonga), dredging on algal gravel 10 m: 14 shells. Santa Marta, dredging 40 m on shell sand: numerous specimens and shells.

Description
Shell up to 2·1 × 1·2 mm (Holotype 2·1 × 1·15), subcylindrical in shape, with a low spire. Outer lip thickened, rather straight with an abrupt posterior termination, minutely and distinctly denticulated inside. Columella with four thick plaits, decreasing posteriorly in size.

Shell translucent, tawny in colour. Internal sutures and soft parts may be seen by transparency.

Head with orange and yellow spots, and a crescentic brown mark to the inner side of each eye. Foot crawling flat, with the edge slightly curled upwards but not forming parapodia. It has broad radiating areas of yellow, a few orange spots anteriorly and posteriorly, and one or several broad brown patches on the metapodium.

Internal mantle with a reticulation of pale brown, including scattered small orange spots. The brown hue is denser along the anterior area.

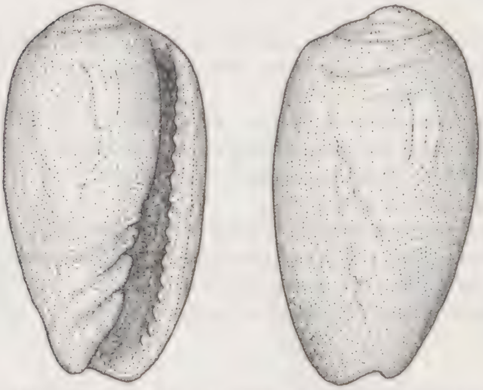


Fig. 38. *Gibberula mendacis* n. sp.: holotype from Bay of Corimba, 20 m. Actual size: 2·1 mm.

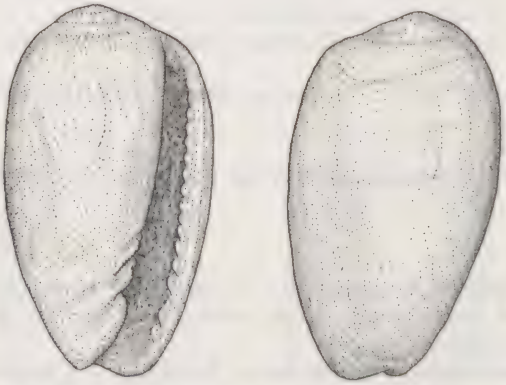


Fig. 39. *Gibberula mendacis* n. sp.: paratype, same locality. Actual size: 2·1 mm.

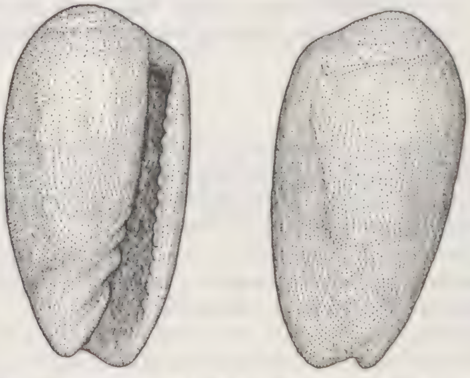


Fig. 40. *Gibberula mendacis* n. sp.: specimen from off Santa Marta, 40 m. Actual size 2·0 mm.

Remarks
This species may be mistaken with *G. columnella*, from which it is distinguished by slightly smaller size and stouter outline, and by the denticulated outer lip. The pattern on head/foot and mantle is also very different.

G. mendacis differs from the next species, *G. confusa* by the distinct denticulation of the outer lip, mantle pattern and attitude of the foot; the shells are otherwise very similar. These differences are considered to be significant because they were observed in populations distant less than 2 km in the same bay.

A large number of specimens dredged off Santa Marta, 40 m (Fig. 40) are similar to the specimens from Corimba and thought to be conspecific. The animal differs only in that the brown mark on the metapodium is large and encloses several small yellow spots. The shells have, in some instances, a more truncated posterior outline.

Habitat
This species has been found on bottoms of shell grit and sand devoid of mud, in 20 to 40 m depth.

Gibberula confusa n.sp. (Figs. 41–42, 61)
Etymology: from Latin confusus, a, um (adjective): 'confusing'.
Type locality: Bay of Corimba, Praia Etambar (province of Luanda), on muddy rocks in 0–1 m.
Type material: Holotype (MNHN), 57 paratypes kept dry (MNHN, BMNH, IIT, UAN, FF) and 16 paratypes in alcohol.
Other material examined
Northern Angola: Barra do Dande, infralittoral rocks: 34 adult specimens and juveniles. Cacuaco, 1 shell.

Description
Shell up to 2·2 × 1·2 mm (Holotype 2·2 × 1·15), oblong in shape, with a blunt spire. Outer lip thickened, smooth inside or with poorly defined denticles. Columella with four plaits, decreasing regularly in size posteriorly.

Shell material translucent, tawny in colour. Internal sutures and soft parts clearly seen by transparency.

Head with orange and yellow spots, and a crescentic mark of crowded tiny black dots behind each eye. Foot raised laterally in parapodia, with large radiating spots of yellow, and few alternating orange spots; several orange spots axially on the metapodium. Internal mantle with a tenuous black reticulation, seeming made of tiny black dots, inserting orange spots and pale yellow areas.

Remarks
This species resembles very closely *G. mendacis* n. sp. The reticulated pattern of the mantle is definitely black, not pale brown; it includes larger and more numerous orange spots on a yellow background. The foot has no brown marks on the metapodium, and is distinctly folded in parapodia unlike *G. mendacis* and *G. columnella*.

G. confusa n.sp. differs from *G. columnella* by a smaller size, stouter and less truncated outline of the shell, a shallower channel at posterior termination of the aperture. The pattern on head/foot and mantle is different in *G. columnella*.

Habitat
G. confusa has been found in an algal mat infilled with mud, on infralittoral rocks 0–1 m.

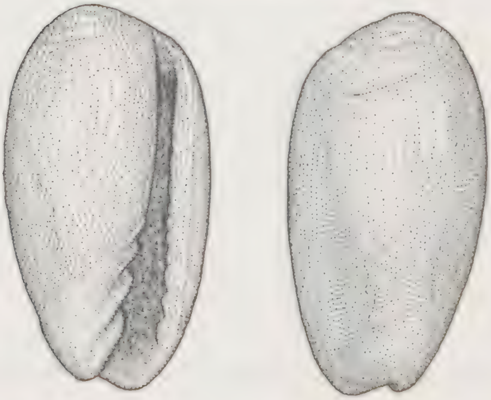


Fig. 41. *Gibberula confusa* n. sp.: holotype from Praia Etambar. Actual size: 2·2 mm.

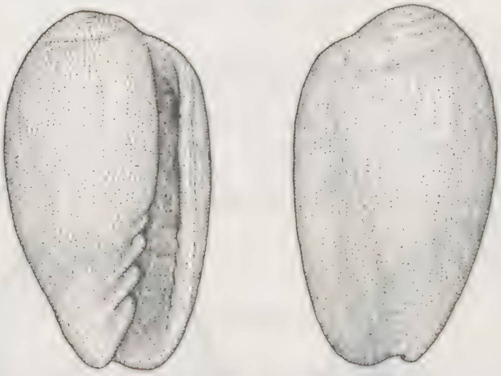


Fig. 42. *Gibberula confusa* n. sp.: paratype, same locality. Actual size 2·1 mm.

Gibberula sp. 1 (Fig. 43)
This kind of very slender shell has been found in dredgings of many southern localities. It differs from *G. columnella* by smaller size and less truncated spire. The outline of the posterior end of the outer lip is evenly rounded, not flaring. The rather smooth outer lip recalls that of *G. confusa* n. sp.

Gibberula sp. 2 (Fig. 44)
The specimen illustrated is 2·8 × 1·5 mm, and there are 22 others all live-taken (but not observed at that time) in a single dredging in the bay of Santa Maria. They look like a large and fat *G. mendacis*, with a very thick anterior end.

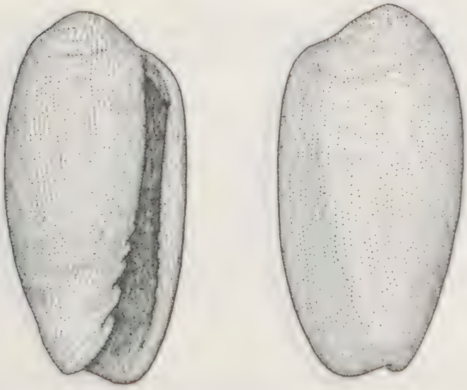


Fig. 43. *Gibberula* sp.: specimen from Bay of Lucira (Bissonga), 15 m. Actual size: 2·2 mm.

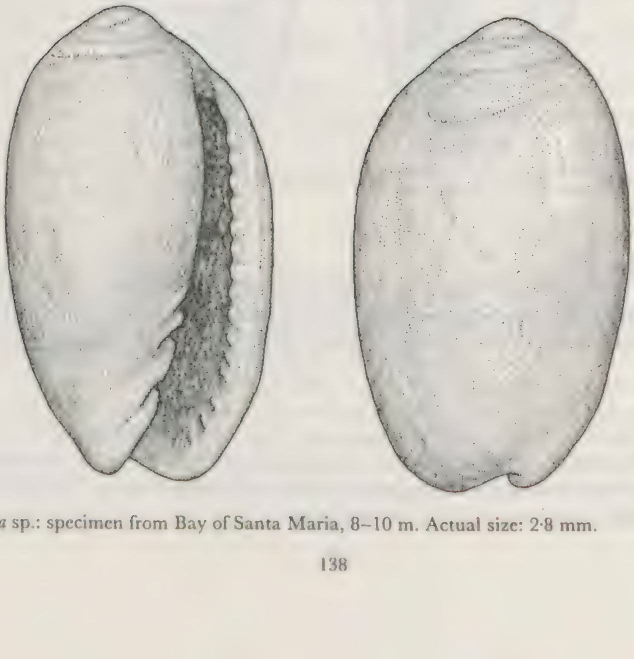


Fig. 44. *Gibberula* sp.: specimen from Bay of Santa Maria, 8–10 m. Actual size: 2·8 mm.

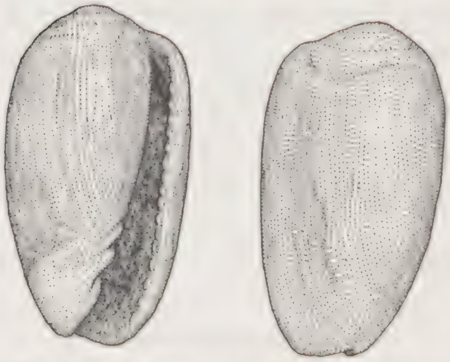


Fig. 45. *Gibberula* sp.: specimen from bay of Limagem, rocks 1–2 m. Actual size: 1·9 mm.

Gibberula sp. 3 (Fig. 45)
This is a very small species (2 × 1 mm) found alive in the infralittoral algal mat of the bays of Limagens and Santa Maria, alongside with *G. aurata*. The outer lip is minutely denticulated. The growth lines give the surface of body whorl a characteristic frosty appearance.

ACKNOWLEDGEMENTS

The author is grateful to authorities of Universidade Agostinho Neto of Luanda, especially to Eng^{o} Abilio Fernandes, dean of Faculty of Sciences, and Dr. Eduardo Morais, head of Geology department, for assistance in organizing the field trips, and facility given for using University equipment during this work. Thanks are expressed to Dr. Anders Warén (Swedish Museum of Natural History) for mounting the radulae for S.E.M., and to Dr. Philippe Bouchet (MNHN, Paris) for taking the S.E.M. pictures after which the drawings were prepared.

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J. Conch. 33: 141–156 (1989)

NEW DATA ON THE SYSTEMATICS OF TWO SICILIAN LAND SNAILS, *HELIX PARLATORIS* BIVONA, 1839 AND *HELIX REINAE* L. PFEIFFER, 1856 AND DESCRIPTION OF *SCHILEYKIELLA* N. GEN. (PULMONATA: HYGROMIIDAE)[1]

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(*Accepted for publication, 21st May, 1988*)

Abstract: The new genus *Schileykiella* is described for two small helicoid species of the Hygromiidae living in Sicily (Italy). An analysis of the possible relationships between the new genus and other taxa of the same family, the redescription of the two species and comments on their origin, distribution and ecology conclude the paper.

INTRODUCTION

Helix parlatoris Bivona, 1839 and *Helix reinae* L. Pfeiffer, 1856[4] are two species with very similar shells living in Sicily. They were frequently cited in the malacological literature of the past century but have been almost completely forgotten in recent years.

Alzona (1971) includes them among the 'Fruticicolinae incertae sedis aut dubiae', whereas Richardson (1980) enlists them in the Hygromiinae (the same nominal species *H. parlatoris* in two different genera, *Trichia* and *Ciliella*; *H. reinae* in the genus *Trichia*).

While collecting material for studies on the Sicilian malacofauna we happened to find a few living adult specimens of both species which we utilized for anatomical research. Our data not only allowed us to confirm the validity of the two taxa as distinct species, but also to include them in a well defined new genus.

Schileykiella new genus
Type species: *Helix parlatoris* Bivona

Description

Shell: small, pilose, brown in colour, flattened or very low conical above, convex-rounded below, with a spire of 4–5 slowly and regularly increasing whorls separated by deep sutures. Last whorl, more or less descendant, more or less angled at or just above the periphery. Umbilicus, deep and wide 1/5–1/4 of the maximum shell diameter. Mouth oval or rounded, peristome not thickened, slightly reflexed at its lower margin.

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[3] Corso Finocchiaro Aprile, 188; I–98138 Palermo (Italy).

[4] According to the 1961 and 1964 editions of the ICZN these two names should be amended to *H. parlatorei* and *H. reinai*. We have left the original spelling *H. parlatoris* and *H. reinae* (Parlatore and Reina can be considered Latin names of the third and first declension respectively) to be in line with the Art. 31 of the 1985 edition of the ICZN.

External surface of the protoconch marked with growth-lines, and a few short hairs or impressions of hair roots. Periostracal surface of the teleoconch with transverse rows of hairs and minute longitudinal crests.

Genital Duct: characterized by a very short vagina, without any trace of dart-sac complex and digitiform glands. The duct of the bursa copulatrix (=gametolytic gland) is highly variable in length and width but its initial portion is always flared. The bursa copulatrix is small, oval or rounded in shape, it adheres to the ovispermiduct surface and has no relation at all to the diaphragm.

The penis (the portion of the penial complex from the point of attachment of the penial retractor to the genital atrium) and the epiphallus (the portion of the penial complex from the point where the penial retractor is inserted to the point where the vas deferens ends and the penial flagellum arises) appear almost equal in length. The flagellum is variable in length, from short to very long. The penis is partly enveloped by a thin muscular sheath. The penial retractor arises from the diaphragm wall and terminates at the penial complex in coincidence with the very beginning of the penial sheath. There is no hygromiid-like penial papilla (i.e. a papilla traversed by a spermatic canal or if not traversed at least embracing the epiphallus or proximal penis opening into the penis (or into the distal penis) with its base and having a sperm groove on one side). A compact 'pseudopapilla', variable in shape and size, arises from a side of the inner surface of the medial portion of the penis.

The right ommatophore retractor passes between penis and vagina.

The mantle collar has no features which distinguish it from other Hygromiidae.

Derivatio nominis

The new genus is dedicated to Dr. A. A. Schileyko of Moscow (USSR) as a token of friendship and esteem for his work in malacological systematics.

Schileykiella parlatoris (Bivona, 1839)

(Figs. 1–3; Pl. 10, figs. A–E; Pl. 12, figs. A–D; Pl. 15, figs. A–C; Pl. 16, fig. F)

Helix Parlatoris Bivona, 1839. *L'Occhio, Giornale di Scienze, Amena Letteratura e Belle Arti*, **9**: 65–66, Fig. 1.

Helix Parlatoris, – Bivona, 1839. Extract from *Giornale Letterario*, **198**: 15–16.

Helix Parlatoris, – Aradas & Maggiore, 1841. *Atti Accad. Gioenia Sci. Nat. Catania*, (I), **17**: 73.

Helix Parlatoris, – Rossmässler, 1842. *Iconographie Land und Süsswasser Mollusken*, (I), **2** (5): 2–3, Fig. 688.

Helix Parlatoris, – Calcara, 1842. *Esposizione dei molluschi terrestri e fluviatili dei contorni di Palermo*: 13.

Helix Parlatoris, – Calcara, 1845. *Atti Accad. Sci. Lett. Palermo*, (N.S.), **1**: 16.

Helix Parlatoris, – Philippi, 1844. *Enumeratio molluscorum Siciliae*, **2**: 107, Pl. 21: fig. 4.

Helix Parlatoris, – L. Pfeiffer in Martini & Chemnitz, 1846. *Systematisches Conchylien-Cabinet*, Ed. II, **1** (12, 2nd–3rd parts): 169, Pl. 95, figs. 26–28.

Helix Parlatoris, – L. Pfeiffer, 1848. *Monographia Heliceorum viventium*, **1**: 126.

Hygromia Parlatoris, – Adams & Adams, 1855. *The genera of the recent Mollusca*, **2**: 215.

Helix Parlatoris, – Benoit, 1857. *Illustrazione sistematica critica iconografica dei Testacei extramarini della Sicilia Ulteriore*: 95, Pl. 4: fig. 22.

Helix (Fruticicola, Zenobia) Parlatoris, – Albers, 1860. *Die Heliceen nach natürlicher Verwandtschaft*: 104.

Helix (Trichia) Parlatoris, – Paulucci, 1878. *Materiaux pour servir à l'étude de la faune malacologique terrestre et fluviatile de l'Italie*: 3.

Helix (Satsuma, Zenobia) Parlatoris, – Clessin, 1881. *Nomenclator Heliceorum viventium*: 122.

Helix (Helicella, Fruticicola, Trichia) Parlatoris, – Tryon, 1887. *Manual of Conchology, Pulmonata*, (II) **3**: 179, Pl. 40: figs. 39–40.
Helix (Fruticicola, Trichia) parlatoris, – Westerlund, 1889. *Fauna*, **2**: 52–53.
? parlatoris, – Alzona, 1971. *Atti Soc. Ital. Sci. Nat. Mus. Civ. Stor. Nat. Milano*, **111**: 180.
Ciliella parlatoris, – Richardson, 1980. *Tryonia*, **3**: 440.
Trichia perlatoris (sic!), – Richardson, 1980. *Tryonia*, **3**: 482.

Description
Shell: (Pl. 10, figs. A–E; Pl. 12, figs. A–D): small, pilose, brown in colour, completely flat or very slightly raised above, convex – rounded below, with a spire formed by 4–4½ slowly and regularly increasing whorls separated by deep sutures. Last whorl angled above the periphery, slowly descending near the mouth. Umbilicus deep and wide 1/5–1/4 of the shell maximum diameter. Mouth oval, oblique; peristome not thickened, slightly reflexed at its lower margin.

External surface of the protoconch with a microsculpture formed by very fine longitudinal lines and marked by evident growth lines and rows of small hairs or impressions of hair roots. Periostracal surface of the teleoconch with transverse rows of hairs and minute longitudinal crests. The length of the hairs increases from the sutures to the whorl periphery. The hairs along the keel are the longest (1·8–2·5 mm on the third whorl). The minute crests are interrupted for long tracts on the surface of the first whorls and frequently also on the last whorl in correspondence with the growth lines. Groups of minute crests converge to the base of the hairs.
Dimensions: shell max. diam. 6·5–8·0 mm; shell height 3·5–4·5 mm; max. diam. mouth 2·7–3·3 mm; mouth height 2·6–3·4 mm.

Genital duct (Figs. 1–2). The penial complex consists proximally of a moderately long penial flagellum which at its base is equal in calibre to the epiphallus which follows. The epiphallus (i.e. the part extending from the end of the vas deferens to the point of attachment of the penial retractor muscle) is longer than the flagellum. The penis (i.e. the part extending from the end of the penial retractor to the genital atrium) is almost as long as the epiphallus and partly enveloped by a thin muscular sheath which ends close to the point of insertion of the penial retractor. A contraction of the muscular sheath can cause the penis to twist on itself or its proximal half to fold into its distal half. The penial retractor muscle is usually short. Inside the penis there is no hygromiid-like penial papilla (see definition in the description of the new genus). It is apparently substituted almost half way along the length of the penis by a solid lateral 'knob' which in one case appeared inflated and erected as a kind of pseudopapilla. The inner surface of the penial wall in corresondence with the 'knob' shows a system of plicae some of which are fragmented in rows of papillae-like structures. Moving distally (in the direction of the genital atrium) the plicae are uninterrupted and slowly become less evident, assuming a sponge-like appearance. One of the dissected specimens showed an incompletely developed male portion of the genital duct. The vas deferens was short and ended in a sort of compact tumor. As a consequence there was no continuity between the vas deferens and the penial complex. The latter appeared to lack the flagellum and the epiphallus. The uterine portion of the ovispermiduct continues anteriorly into a long slender uterine canal (i.e. free oviduct) which ends in the vagina at the point of entry of the ductus of the bursa copulatrix (i.e. gametolytic gland). The bursa copulatrix is small and sac-like. The initial portion of the ductus of the bursa copulatrix is flared and shows a series of slender pleats running along the inner surface of its walls. The vagina is fairly short: half the length of the ductus of the bursa copulatrix. The inner surface of its walls shows a series of slender pleats.

The Radula (Pl. 15, figs. A–C): consists of many rows each of 45–49 teeth according to the formula: 22–24 + C + 22–24. The central tooth has a wide basal plate with raised and pointed upper vertices. The body of the tooth has an apex with a strong mesocone and two small ectocones. In one of the specimens dissected the radula showed an abnormal central tooth having a normal basal plate but a body lacking one of the ectocones. The first lateral teeth also have a wide basal plate, but the inner vertex is missing. The body has a strong pointed mesocone and a small pointed ectocone. The inner side of the mesocone does not show any protuberance but is gently concave. Moving laterally, the teeth maintain the same shape but become progressively smaller with more slender cusps and reduced basal plates. By 17th–18th tooth of some of the rows, the ectocone apex is split into two points. The extreme marginal teeth are very small. Their mesocone sometimes shows a very small protuberance on its inner side and the ectocone is split into a series of 2–4 very small points.

The Jaw (Pl. 16, fig. F): is of the odontognathous type. Its ribs are not pronounced and its central portion pointed as in the manner of oxygnathous type.

Locus typicus
About the locus typicus Bivona (1839) wrote: 'Trovansi nel monte Cuccio ed in quello di Busambra'. We restrict it to: Monte Cuccio near Palermo (Sicily).

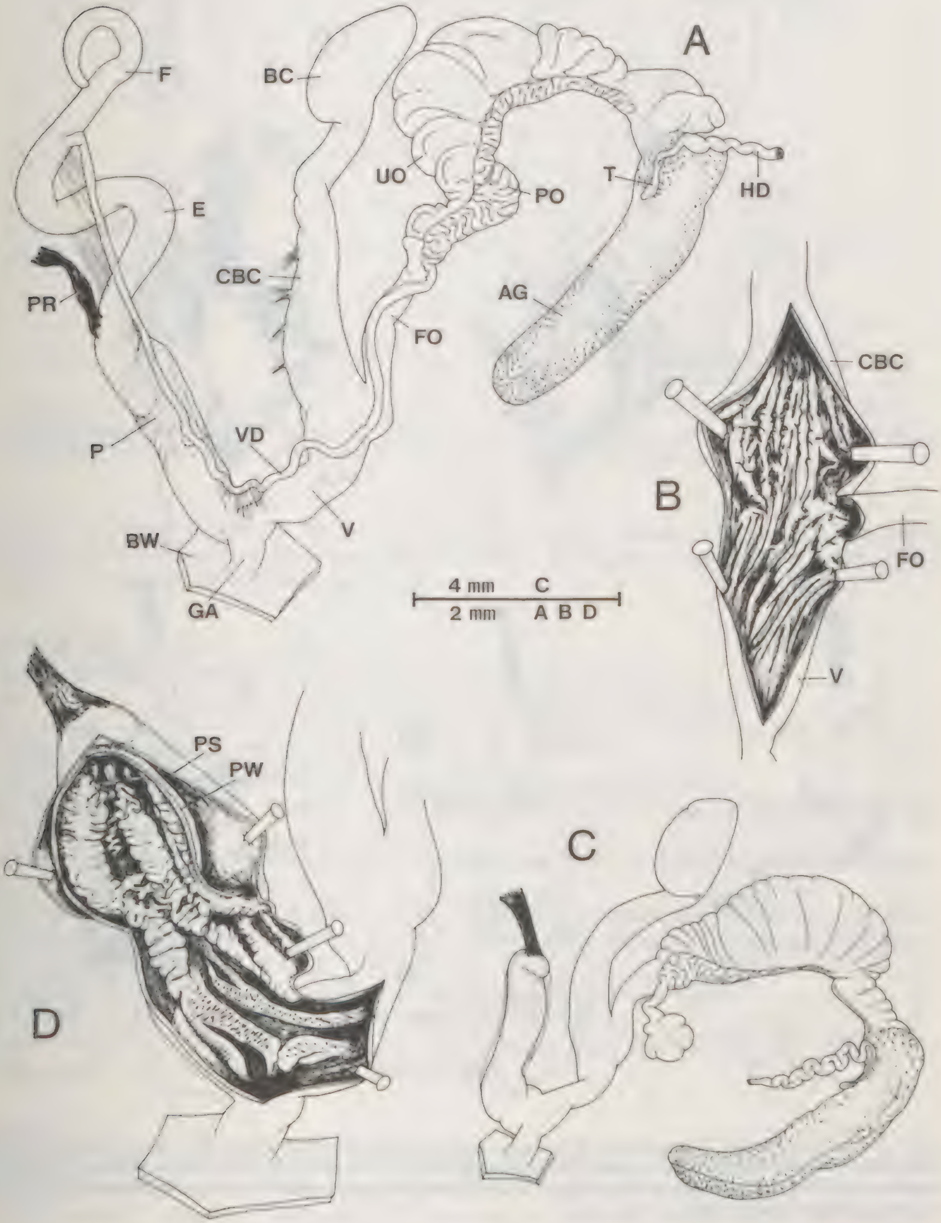
Typical series
1 syntype from Monte Cuccio near Palermo, ex Philippi, Rossmässler Coll., SMF 183565a, specimen figured in the Iconographie n. 688. Philippi (1844) wrote: 'cl. Bivona filius mecumque specimina benevole communicavit; Rossmässler XI p. 2, f. 688 ad specimina a me accepta'.

Material examined
Materials from the type locality, Monte Cuccio near Palermo:
1) 4 sps., ex Di Maria di Monterosato Coll., SMF 183567.
2) 1 sp., De Betta Coll., MCSNV. 3) 2 sps., Benoit leg. 1876, Paulucci Coll., MZUF 4709. 4) 7 sps., Reina leg. X.1877, Paulucci Coll., MZUF 4710. 5) 8 sps., Di Maria di Monterosato leg. (3 sps.), Reina leg. 1870 (5 sps.), Paulucci Coll., MZUF 4712. 6) n. sps., Sparacio leg., 26.XI.85, 8.I.86, 1.II.86, 28.V.86, GCUS.

Materials from other sites: 1) Calaforno near Giarratana, 3 sps., Paulucci Coll., MZUF 4713. 2) Calatafimi, 1 sp., Priolo Coll., MCSNM. 3) Militello, 5 sps., Paulucci Coll., MZUF 4711. 4) Palermo, 11 sps., Priolo Coll., MCSNM. 5) Palermo, 2 sps., MZSUT. 6) Rocca di Busambra, n. sps., Pirajno di Mandralisca Coll., FCMC. 8) Sicilia, 2 sps., MZSUT. 7) No locality, 12 sps., Priolo Coll., MCSNM.
Explanations of the abbreviations used in the material examined of *S. parlatoris* and *S. reinae*: FCMC Fondazione Culturale Mandralisca Cefalù. GCUS Giusti Coll. Dipartimento di Biol. Evolutiva, Univ. di Siena (Italy). MCSNM Museo Civico di Storia Naturale di Milano (Italy). MCZR Museo Civico di Zoologia di Roma (Italy). MCSNV Museo Civico di Storia

Fig. 1. *Schileykiella parlatoris* (Bivona). Genital duct in specimens collected on Mt. Cuccio (Palermo). A–B: a genital duct (A) and the inner structure of the walls of the vagina and the duct of the bursa copulatrix (B). C–D: a genital ductus with the male portion lacking the epiphallus, the flagellum and the last portion of the vas deferens (C) and the inner structure of the penial and vaginal walls of the same specimen.

Explanations of the symbols used in Figs. 1–4: AG albumen gland, BC bursa copulatrix (= gametolytic gland), BW body wall, CBC ductus of the bursa copulatrix, E epiphallus, F flagellum, FO free oviduct, GA genital atrium, HD hermaphrodite duct, P penis, PO prostatic portion of the ovispermiduct, PLS solid lateral knob which imitates a true penial papilla, PP penial papilla, PR penial retractor muscle, PS penial sheath, PW penial wall, UD uterine portion of the ovispermiduct, V vagina, VD vas deferens.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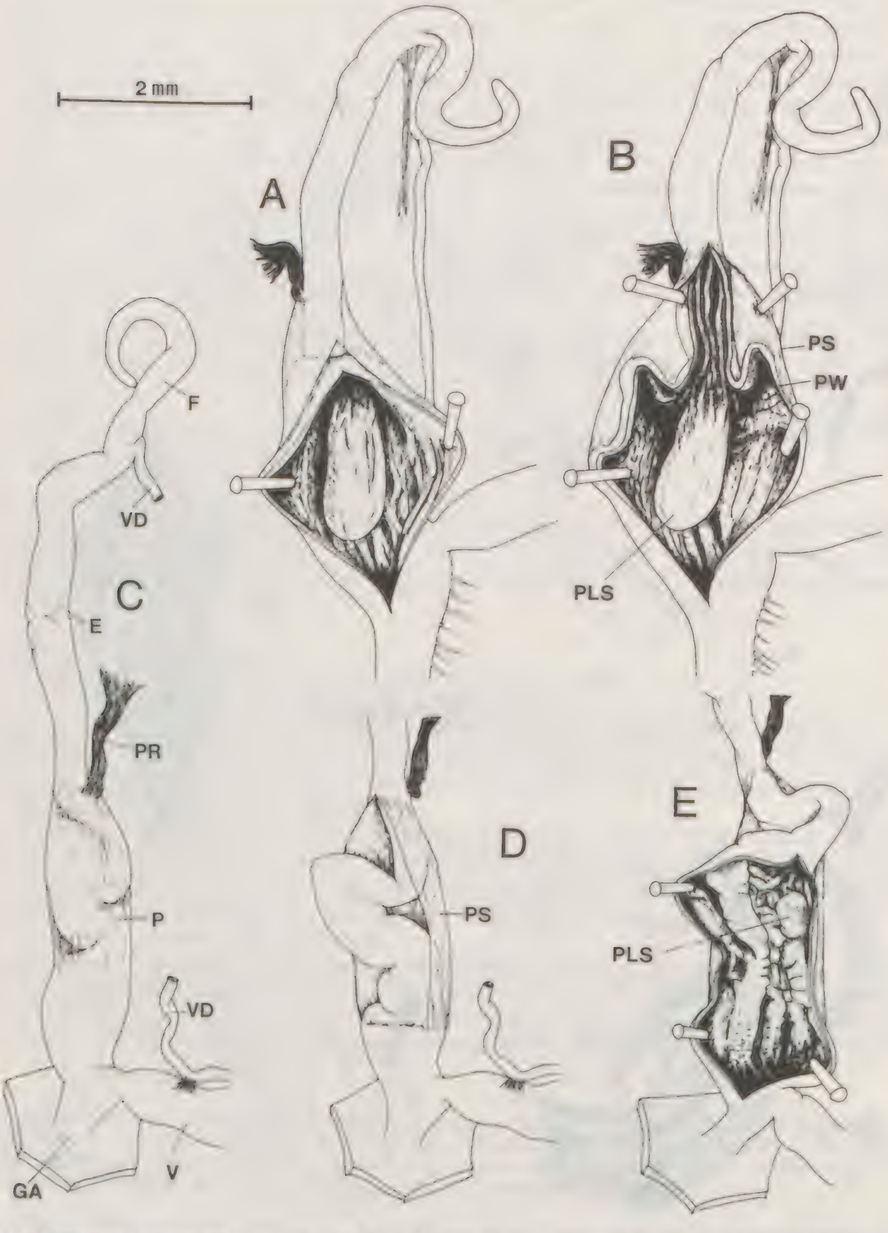

Fig. 2. *S. parlatoris* (Bivona). The structure of the penial complex in two specimens from Mt. Cuccio (Palermo). The contraction of the penial sheath has caused the infolding (A–B) or the twisting of the penis. In the penis of one specimen (A–B) there is a large solid lateral pseudopapilla; in the other specimen there is a small lateral knob (E). For explanation of the symbols see Fig. 1.

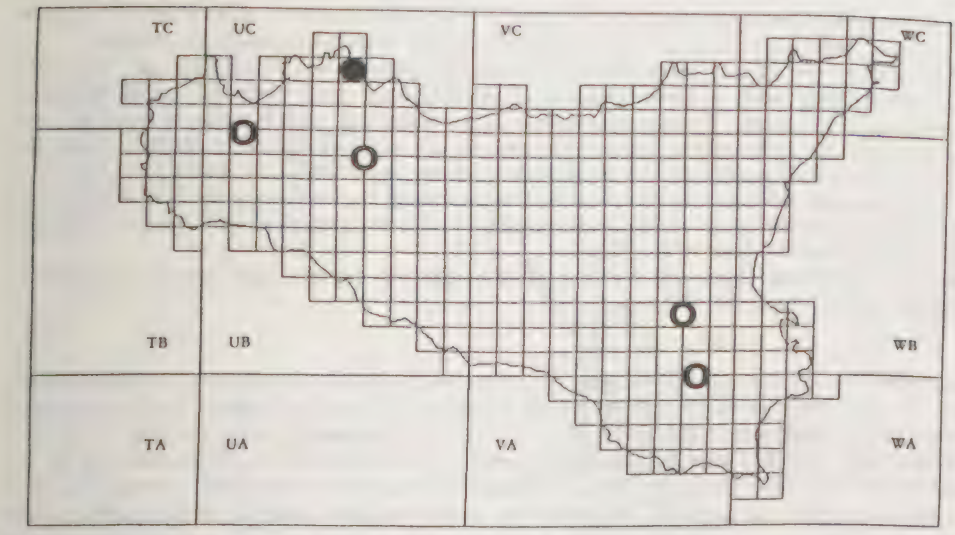

Fig. 3. Distribution of *S. parlatoris* (Bivona) on a UTM map of Sicily plotted on 10 × 10 kilometre squares. Full dots: anatomically determined populations; empty dots: anatomically unknown populations.

Naturale di Verona (Italy). MZSUT Museo di Zoologia Sistematica dell'Università di Torino. MZUF Museo di Zoologia dell'Università di Firenze (Italy). SMF Senckenberg Museum Frankfurt (West Germany).

Schileykiella reinae (L. Pfeiffer, 1856)
(Figs. 4–5; Pl. 11, figs. A–D; Pl. 13, figs. A–D; Pl. 15, figs. D–F)
Helix Reinae L. Pfeiffer, 1856. *Malakol. Bl.*, **2**: 183–184, Pl. 2: figs. 14–17.
Helix Reina (sic!), – Benoit, 1857. *Illustrazione sistematica critica iconografica dei Testacei extramarini della Sicilia Ulteriore*: **96**, Pl. 4: fig. 11.
Helix Reinae, – L. Pfeiffer, 1859. *Monographia Heliceorum viventium*, **4**: 117.
Helix (Fruticicola, Zenobia) Reinae, – Albers, 1860. *Die Heliceen nach natürlicher Verwandtschaft*: 104.
Helix (Trichia) Reinae, – Paulucci, 1878. *Materiaux pour servir à l'étude de la faune malacologique terrestre et fluviatile de l'Italie*: 3.
Helix (Satsuma, Monacha) Reina (sic!), – Clessin, 1881. *Nomenclator Heliceorum viventium*: 120.
Helix (Helicella, Fruticicola, Monacha) Reinae, – Tryon, 1887. *Manual of Conchology. Pulmonata*, (II) **3**: 187, Pl. 41: figs. 13–15.
Helix (Fruticicola, Trichia) reina (sic!), – Westerlund, 1889. *Fauna*, **2**: 53.
Helix Reina (sic!), – De Gregorio, 1896. *Nat. Sicil.*, 14: 198.
? reinae, – Alzona, 1971. *Atti Soc. Ital. Sci. Nat. Mus. Civ. Stor. Nat. Milano*, **111**: 180.
Trichia reinae, – Richardson, 1980. *Tryonia*, **3**: 484.

Description
Shell (Pl. 11, figs. A–D; Pl. 13, figs. A–D): small, pilose, brown in colour, low conical above, convex below, with a spire formed by 4–4½ slowly and regularly increasing whorls separated by deep sutures. Last whorl peripherally more or less evidently angled, gently descending

near the mouth. Umbilicus deep and wide 1/5–1/4 of the maximum diameter of the shell. Mouth oval, oblique; peristome not thickened, slightly reflexed at its lower margin.

Microsculpture of the external surface of the protoconch consisting of very fine longitudinal lines with evident transverse growth lines and rows of small hairs or impressions of hair roots. Periostracal surface of the teleconch with transverse rows of short hairs and minute longitudinal crests. The length of the hairs increases slightly from the sutures to the whorl periphery. At the periphery of the third whorl the hairs are 1–1·3 mm long. The minute crests are interrupted for long tracts on the surface of the first whorls and frequently also on the last whorl in correspondence with the growth lines. Groups of minute crests converge to the base of the hairs.

Dimensions: shell max. diam. 7·5–8·0 mm; shell height 4·0–4·5 mm; max. diam. mouth 2·3–2·5 mm; mouth height 3·5–3·9 mm.

Genital duct (Fig. 4). The penial complex consists proximally of a slender and extraordinarily long (23–32·2 mm) penial flagellum which at its base is equal in calibre to the proximal portion of the epiphallus. The epiphallus (i.e. the part extending from the end of the vas deferens to the point of attachment of the penial retractor muscle) is almost as long as the penis (2–2·5 mm). The penis (i.e. the part extending from where the penial retractor ends to the genital atrium) is partially enveloped by a thin muscular sheath which ends at the insertion of the penial retractor muscle. Inside the penis there is no hygromiid-like penial papilla (see definition in the description of the new genus). It is apparently substituted by a solid lateral 'knob' resembling a bean or a mushroom-like extroflection of one of the pleats which run inside the penis. The inner surface of the penial walls is crossed by two large pleats (one of which gives rise to the 'knob') and other minor pleats which in the distal part break up into portions of a spongy appearance. The uterine portion of the ovispermiduct continues anteriorly into a long slender uterine canal (i.e. free oviduct) which ends in the vagina at the point of entry of the ductus of the bursa copulatrix (i.e. gametolytic gland). This ductus has a flared initial portion and is very long (25–27 mm). The flared portion is internally traversed by a series of slender pleats. The bursa is small, sac-like or roundish. The vagina is very short (1–1·3 mm) with pleated walls.

The Radula (Pl. 15, figs. D–F): consists of many rows each of 45–47 teeth according to the formula 22–23 + C + 22–23. The central tooth has a wide basal plate whose upper vertices are raised and pointed. The body of the tooth has an apex provided with a strong sharp mesocone and two small ectocones. The first lateral teeth also have a wide basal plate, but the inner vertex is missing. Their body shows a strong pointed mesocone and a small pointed ectocone. The inner side of the mesocone does not show any protuberance but is gently concave. Moving laterally the teeth maintain the same shape but become progressively smaller with more slender cusps and reduced basal plates. The 13th–15th tooth of some of the rows has a slight protuberance on the inner side of the mesocone and the ectocone split into two points. The extreme marginal teeth are very small. Their mesocone sometimes shows a small protuberance on its inner side and the ectocone is split into a series of 2–3 small points.

Locus typicus

About the locus typicus L. Pfeiffer (1856) wrote: 'Habitat in Sicilia'. Benoit (1857) restricted it to the environs of Calatafimini (= Calatafimi). We select Mt. Inici (6 km from Calatafimi) (Trapani) as a locus typicus restrictus.

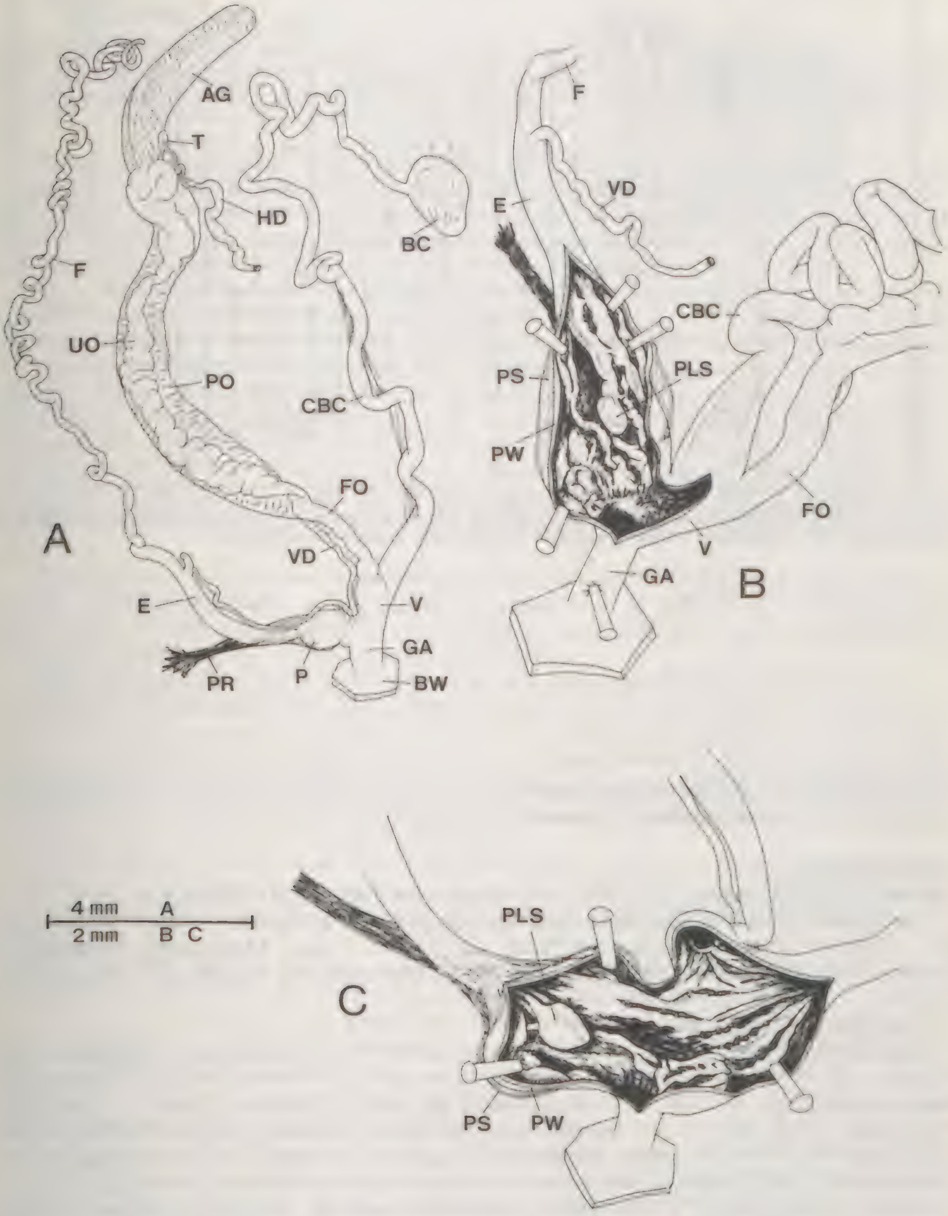

Fig. 4. *Schileykiella reinae* (L. Pfeiffer). The genital duct (A) and the inner structure of the penis, vagina and proximal portion of the ductus of the bursa copulatrix in specimens collected on Mt. Inici (Trapani). For explanation of the symbols see Fig. 1.

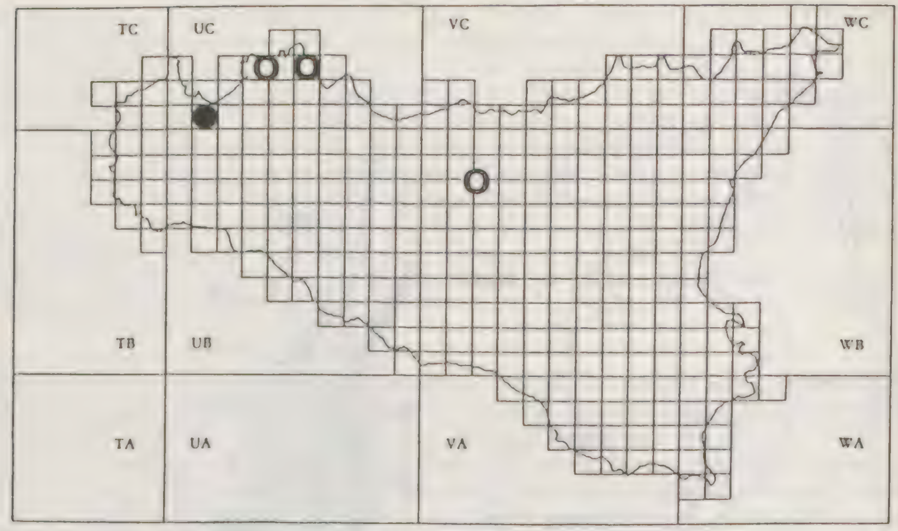

Fig. 5. Distribution of *S. reinae* (L. Pfeiffer) on a UTM map of Sicily plotted on 10 × 10 kilometre squares. Full dots: anatomically determined populations; empty dots: anatomically unknown populations.

Typicus series

Although we have studied a large number of shells from historic collections we have not found any shell corresponding to possible syntypes.

Material examined

Material from the type locality, Mt. Inici (6 km from Calatafimi) (Trapani):
1) 16 sps., Di Maria di Monterosato Coll., MCZR. 2) 6 sps., Krüper Coll., SMF 100904. 3) 5 sps., Giusti & Manganelli leg. 12.IX.84, GCUS. 4) 5 sps., Manganelli, Fanciulli & Malatesta leg. 3.IV.85, GCUS. 5) n. sps., Sparacio leg. 12.III.85, 4.XI.85, 2.IV.86, 10.I.87, GCUS.

Material from other sites:
1) Calatafimi (Trapani), 4 sps., Blanc Coll., MZSUT. 2) Calatafimi (Trapani), 1 sp. Sparacio leg. 5.XII.84, GCUS. 3) Castellaccio near Carini, 150 m, 3 sps., Di Maria di Monterosato Coll., MCZR. 4) Castellammare del Golfo (Trapani), 3 sps., Di Maria di Monterosato Coll., MCZR. 5) Castellammare del Golfo (Trapani), n. sps. SPARACIO leg. 12.XII.84, GCUS. 6) Madonie Mountains, 2 sps., ex Di Maria di Monterosato Coll., Jetschin Coll., SMF 100905. 7) Madonna della Scala near Castellammare del Golfo, n. sps., Sparacio leg. I.86, GCUS. 8) Maredolce, 5 sps. Settepassi Coll., MCZR. 9) Palermo, 5 sps., Kobelt Coll., SMF 183573. 10) Palermo, 2 sps., Settepassi Coll., MCZR. 11) Sicily, 1 sp., De Betta Coll., MCSNV. 12) No locality, 13 sps., Di Maria di Monterosato Coll., MCZR.

For the explanations of the abbreviations see material examined of *S. parlatoris*.

DISCUSSION

Simple light microscopic examination of the shell suggests that the new genus is related to some well known taxa of the Hygromiidae with small pilose shells, particularly *Xerotricha*, *Xeromicra*, *Microxeromagna*, its unique notable difference consisting in the longer periostracal hairs.

The anatomical peculiarities listed in the diagnosis of the new genus are, however, such to immediately exclude this possibility (*Xerotricha*, *Xeromicra* and *Microxeromagna* have a genital duct with a well developed dart-sac complex) and to qualify the new taxon as different from any other 'helicoid' genus known to live in the European and Mediterranean provinces of the Palaearctic Region whose anatomy has been described in detail.

These anatomical peculiarities make it very difficult to define the position of the new taxon in the classification scheme of the helicoids now in use. By virtue of the total lack of vaginal accessory structures on the one hand and the nature of the penial complex structure on the other, we can only at present say that *Schileykiella* n. gen. appears to lie close to some members of two traditionally distinguished groups of the helicoids: the hygromiids and the helicodontids. These two groups have recently been considered to belong to a unique family (Hygromiidae: Nordsieck 1986, Giusti & Manganelli 1987) or have been split into more than two families (Schileyko 1972a, Damianov & Likharev 1975, Schileyko 1978b, Schileyko *in litt.*; see also Giusti & Manganelli 1987). Schileyko (1979) considers the Hygromiidae and the Helicodontidae to belong to two distinct superfamilies: Hygromioidea and Helicodontoidea.

Nevertheless as Giusti and Manganelli (1989) have demonstrated in redescribing the Spanish genus *Montserratina* Ortiz De Zarate Lopez, it is difficult to distinguish the hygromiids from the helicodontids at family or even subfamily level, and would require a detailed anatomical study of the entire group of species.

This is particularly evident in the case of species with a simplified genital duct structure. As Giusti and Manganelli (1987, 1989) and Manganelli and Giusti (1988) have pointed out, when a taxon has a genital duct lacking most or any vaginal accessory structures (dart-sac complex, its derivates and digitiform glands) its position in the classification scheme is a matter of opinion, or at best based on characters the true diagnostic value of which has yet to be determined (i.e. penial complex structure, position of the right ommatophore retractor, shell shape and periostracal microsculpture, etc.).

This is clearly the case with *Gasulliella* Gittenberger (1980), a taxon considered in a previous study by Ortiz De Zarate Rocandio & Ortiz De Zarate Lopez (1961) and in the paper in which it was described by Gittenberger (1980), a genus belonging to the subfamily Helicodontinae.

The shell, the radula, the jaw and the simplified genital duct scheme (there is no information on the inner structure of the penial complex and the presence/absence of a penial papilla) are insufficient to formulate a hypothesis on its subfamilial status. There is also a very similar simplified genital duct scheme in *Cyrnotheba corsica* (Shuttleworth) from Corsica (see Giusti & Manganelli 1987), but in this case, the presence of a typical hygromiid penial papilla and shell structure have made it possible to propose its assignment to the Hygromiinae sensu Schileyko (1972a, 1978b).

Apart from its very different shell, *Gasulliella* is similar in its genital duct scheme to the two *Schileykiella* species (more to *S. parlatoris* than to *S. reinae*). From its description in the literature (Ortiz De Zarate Rocandio & Ortiz De Zarate Lopez 1961, Gittenberger 1980) it appears to differ mainly in the simpler structure of the penial complex which is not enveloped by a muscular sheath, and the very slender initial portion of the canal of the bursa copulatrix (=gametolytic gland).

Another genus which by virtue of its genital duct scheme can be considered to lie close to *Schileykiella* n. gen. is *Ciliella*. This taxon too has an as yet undefined suprageneric position. In the classical systematic classification it was considered to belong to the subfamily Hygromiinae of the Helicidae, but according to Schileyko (1972a, 1973, 1978a) it might possibly belong to a distinct subfamily, Ciliellinae, of the Hygromiidae. *Ciliella* (Fig. 6) appears to be characterized mainly by its genital duct which shows the following peculiarities: the penial complex is furnished with a large penial papilla whose base entirely embraces the opening of the epiphallus into the penis; the papilla has a shape similar to that of a wrinkled tongue and delimits a spermatic sulcus into the base of which the epiphallus opens; the proximal portion of the epiphallus and the basal portion of the flagellum widen and they have two large plicae and numerous drop-like papillae on the internal surface of their walls. As for the microstructure of the surface of the periostracal layer of the shell, *Cilella* (Pl. 14, figs. A–E) is quite different from *Schileykiella* n. gen. It is in fact more similar to *Cyrnotheba* and to certain Hygromiidae which according to Schileyko's systematics can be included in the Hygromiinae (see Giusti & Manganelli 1987). The radula and the jaw in *Ciliella* (Pl. 16, figs. A–E) also differ from those in *Schileykiella*. While the central and lateral teeth of the radula show no peculiarity, the marginal teeth have the apex of the mesocone more evidently divided into two points. The jaw appears more strongly ribbed and devoid of a central denticle.

Other genera which appear to lie close to *Schileykiella* n. gen., at least in anatomical structure (their shells are larger, robust and hairless with coloured bands) are those included by Schileyko (1972b, 1978b) in the Hygromiidae subfamily Metafruticicolinae. These genera (*Metafruticicola*, *Cretigena*, *Caucasocressa*) have a right penial retractor muscle passing between penis and vagina, a widened portion of the bursa copulatrix canal, a very short vagina and a complete absence of vaginal annexes (dart-sac complex and their derivatives, digitiform glands). Nevertheless the structure of their penial complex is quite different (Schileyko 1972b, 1978b). Apart from the presence of a true penial papilla, Schileyko (1972b, 1978b) also described a circular cavity inside the walls of the proximal portion of the penis and the penial papilla. This he defined as one of the main diagnostic characters of his new subfamily Metafruticicolinae, can be considered a sign that the Metafruticicolinae descend from the Euomphaliinae (Schileyko *in litt.*). Two other taxa of the genus group can be considered in the present discussion. One is found in Sicily, *Szentgalia*, the other in England, France and the Iberian Peninsula, *Ashfordia*. Although they lack any trace of vaginal annexes, these two taxa show an ommatophore muscle free of the penis and vagina and a penial-complex structure similar to that of the genus *Monacha* (subfamily Euomphaliinae according to Schileyko, 1978b).

It is clear that to distinguish our new genus from apparently similar ones we have ultilized characters 'the true diagnostic value of which has yet to be defined'. We realize this very well, but convinced as we are (Giusti & Manganelli 1987, 1989, Manganelli & Giusti 1988) that similar levels of reduction in structure and number of organs usually annexed to the vagina of the supposed ancestral Hygromiidae (according to Schileyko the Trichiinae) can arise from different ancestral forms, we feel obliged to consider everything that could be of importance in recognizing a possible relationship.

We clearly have not found any evidence about this and consequently while we feel authorized to propose *Schileykiella* as a new genus, we sincerely do not know what to propose for its suprageneric status.

The easiest objectively possible solution of creating a new subfamily seems unfeasible to us, as it has in other similar cases (Giusti & Manganelli 1989). More research is necessary to verify Schileyko's subfamiliar subdivision of the Hygromiidae. In such a situation we prefer to leave *Schileykiella* as an *incertae sedis* taxon in the Hygromiidae.

Our comments on the new genus make it unnecessary to compare *Schileykiella parlatoris*

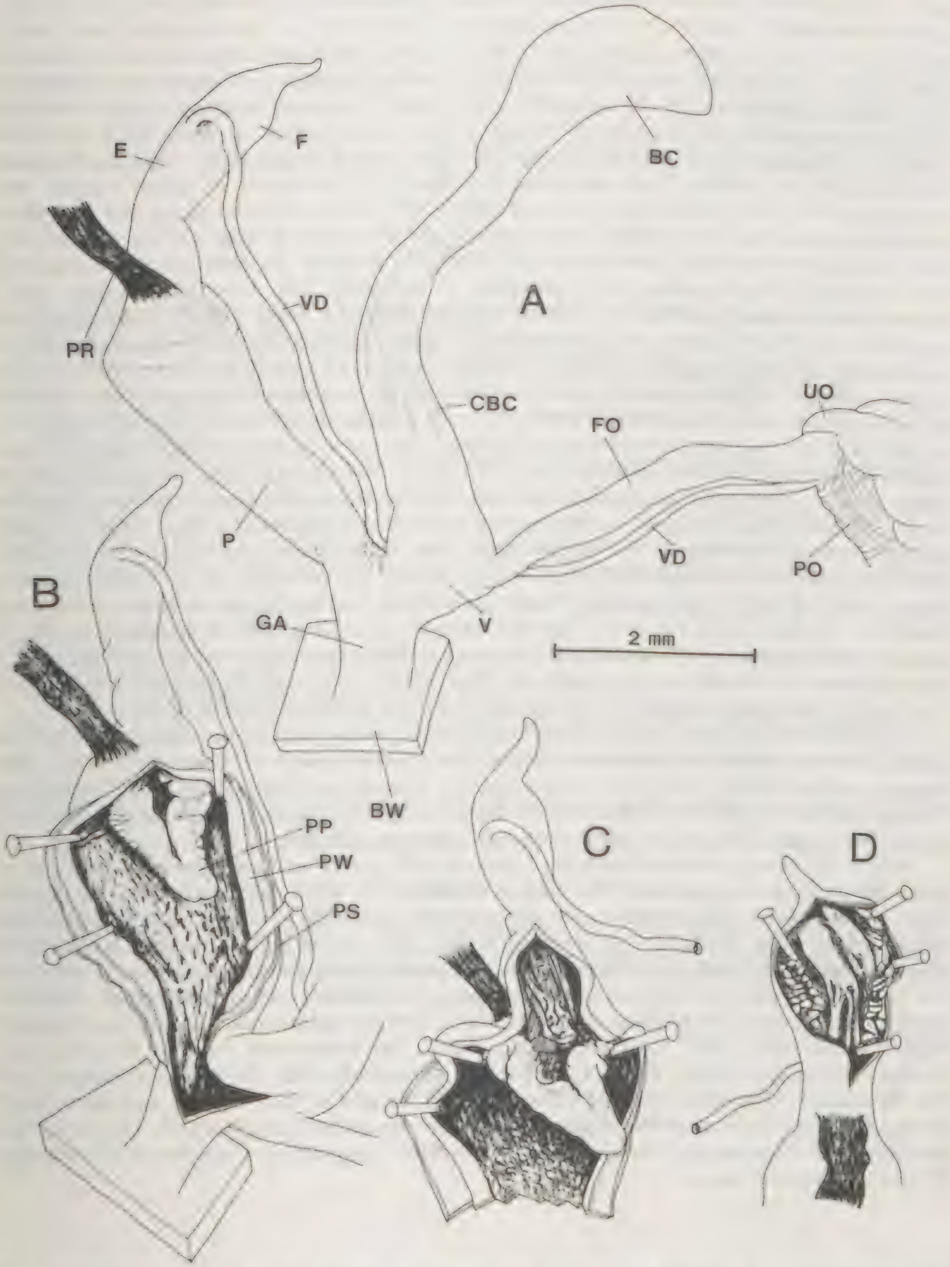

Fig. 6. *Ciliella ciliata* (Studer). The genital duct (A) and the inner structure of the penis (B–C), epiphallus (C) and flagellum (E) in a specimen collected on Mt. Pollino at Timpa del Demonio (Calabria, Italy).

and *S. reinae* with anatomically similar species of other genera. We shall only list the main characters which distinguish the two species. *S. parlatoris* is anatomically very easy to distinguish from *S. reinae*. It has a very short penial flagellum (slightly shorter than the epiphallus). *S. reinae* has an epiphallus of about the same length (ca. 2 mm) but a noticeably longer penial flagellum (14–16 times the epiphallus). The same happens with the ductus of the bursa copulatrix which is very short (ca. 3 mm in *S. parlatoris*, ca. twice the length of the vagina), very long (25–27 mm) in *S. reinae* (20–25 times the length of the vagina). Because of the difficulty in finding living material the dissected specimens of either species were extremely few (3 adults of *S. parlatoris* and only 2 of *S. reinae*). Moreover only one population of either species has been studied. Nevertheless the difference in length of the ductus of the bursa copulatrix and the penial flagellum decisively exclude the possibility of considering our material (corresponding to topotypical *S. parlatoris*, Mt. Cuccio, Palermo and to topotypical *S. reinae*, from Mt. Inici) to be extreme cases of a single species. According to our material, the differentiation of *S. parlatoris* and *S. reinae* into distinct species on the basis of the anatomical characters appears to be adequately confirmed by shell characters. Compared to *S. reinae*, fresh shells of *S. parlatoris* are characterized by longer and larger periostracal hairs; both fresh and old (periostracal layer absent or damaged) shells are characterized by a scalariform spire which is completely flat above or only very slightly raised. Among *S. reinae* material coming from the Calatafimi area (Mt. Inici), some kept in historical collections and some recently collected by ourselves or from other Sicilian sites (one tube from De Betta Coll., MCSNV: Pl. 11, fig. C), a few specimens have been noticed to have angled whorls, reminescent of *S. parlatoris*. We do not think that this reduces the validity of the above described specific differentiation but simply stresses the necessity of a careful approach when studying shells, particularly if badly preserved, hairless or not collected in the type localities. In such cases we advise against attempting a categorical determination. As the study of shells from historical collections seems to have demonstrated, the two species are not restricted to two different and isolated areas. Shells apparently belonging to one species turn out to have been collected in areas lying close to the type locality of the other.

S. parlatoris is the more widely distributed species, being present not only in North-West Sicily (Palermo area) but also in the Iblei region (South Sicily). *S. reinae* on the other hand appears to be limited to the central and western areas of northern Sicily (the Trapani and Palermo areas and Madonie Mountains). Both the species live on calcareous substrates, in woody or maquis biotopes or under stones in open garigue-steppe sites.

As for the genus, it seems hard to propose a sufficiently well founded hypothesis about the origin of the two species. The strong similarity in shell characters and the general organization of the anatomical structures nevertheless seems to suggest a common origin, possibly one from the other, in western Sicily. It is nevertheless possible to postulate Miocene origin followed by differentiation in separate areas during the Pliocene when the rise in sea level divided Sicily into an archipelago of islands, the present major mountain complexes: Madonie, Peloritani, Nebrodi, Iblei, and the calcareous mountains of western Sicily (Sacchi 1955, 1957, La Greca 1957, 1961). The latter were possibly divided into a number of smaller islands, for an example, the present day Mt. Pellegrino (Palermo) and Mt. Sparagio – Mt. Inici complex (Trapani). At the end of the Pliocene and particularly during the glacial phases of the Pleistocene, Sicily was again a single island. This may have permitted the dispersion of the two species from their original sites and favoured mixing of their distributional areas.

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PLATE 10

Schileykiella parlatoris (Bivona). Syntypus (original specimen of Rossmässler 1842 Icon. n. 688) from Mt. Cuccio near Palermo (SMF 183565). Other specimens from historical Collections: B–D: from Mt. Cuccio (De Betta Coll. MCSNV, B; Priolo Coll. MCSNM, C–D) and E from Calatafimi (Priolo Coll. MCSNM).

PLATE 11

Schileykiella reinae (L. Pfeiffer). Three shells from Mt. Inici (Trapani): two collected by us (A, D) and one (B) from the Di Maria di Monterosato Collection (MCSNR). C: one shell kept in De Betta Collection (MCSNV) from Sicily.

PLATE 12

Schileykiella parlatoris (Bivona). Structure of the external shell surface in a specimen from Mt. Cuccio (Palermo). A: the protoconch and a portion of the teleoconch. B: the protoconch is marked by growth lines and shows numerous hair roots and some hairs; microsculpture consisting of very weak longitudinal lines is also visible. C: a portion of the last whorl showing spiral crests and hairs. D: a detail of the preceeding picture showing two hairs and the spiral crests. (A × 45; B × 100; C × 30; D × 200).

PLATE 13

Schileykiella reinae (L. Pfeiffer). Structure of the external shell surface in a specimen from Mt. Inici (Trapani) showing the same peculiarities as the shell of *S. parlatoris*. A: the protoconch and a portion of the teleoconch. B: the protoconch with growth lines, hairs, hair roots and minute longitudinal lines. C: a portion of the last whorl showing spiral crests and hairs. D: an enlarged portion of the last whorl. (A × 50; B × 100; C × 55; D × 130).

PLATE 14

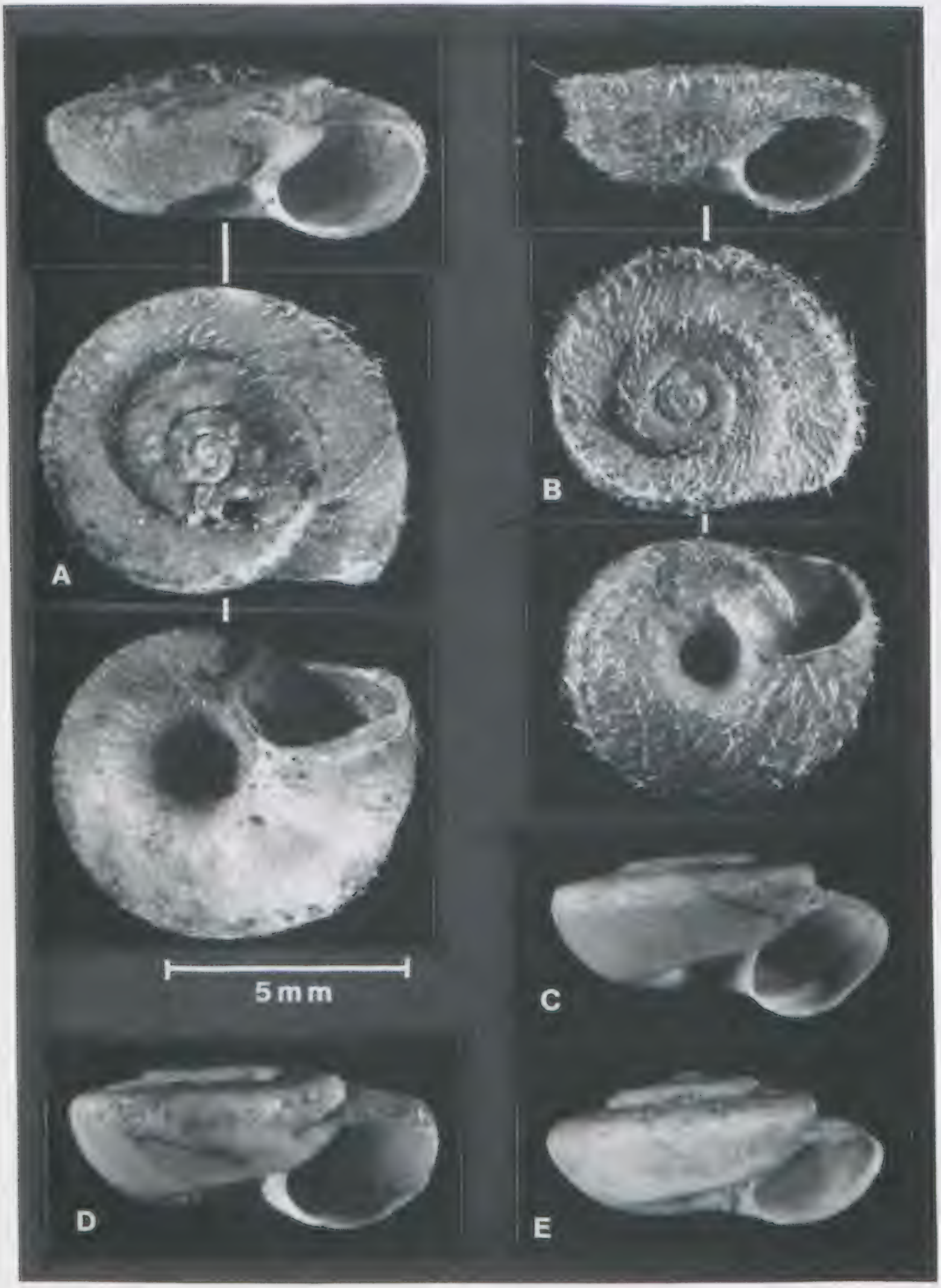
Ciliella ciliata (Studer). The structure of the external shell surface in a specimen collected at San Zeno di Montagna (Venetum, Italy). A: the protoconch and a portion of the teleoconch. B: a detail of the protoconch showing irregularly arranged microsculpture. C: a portion of the last whorl showing peculiar microsculpture consisting of numerous radially arranged nail-like scales, and rows of minute longitudinal crests. D: the peripheral portion of the last whorl with "spines" which correspond to modified nail-like scales. E: a detail of a portion of the last whorl: the surface of the nail-like scales is sculptured. (A × 30; B × 130; C × 60; D × 70; E × 300).

PLATE 15

The radula in a specimen of *S. parlatoris* (Bivona) (A–C) from Mt. Cuccio (Palermo) and in a specimen of *S. reinae* (L. Pfeiffer) (D–F) from Mt. Inici (Trapani). A, D: the central tooth (C) and the first lateral teeth. B, E: 8th–12th lateral teeth. C, F: the extreme marginal teeth. (A–F × 900).

PLATE 16

The radula (A–D) and the jaw (E) of a specimen of *Ciliella ciliata* (Studer) collected on Mt. Pollino at Timpa del Demonio (Calabria, Italy). The jaw (F) of a specimen of *S. parlatoris* (L. Pfeiffer) from Mt. Cuccio (Palermo). A: the central tooth (C) and the first lateral teeth. B: 8th–13th lateral teeth. C: 12th–16th lateral teeth. D: the extreme marginal teeth. (A–D × 800; E × 75; F × 100).



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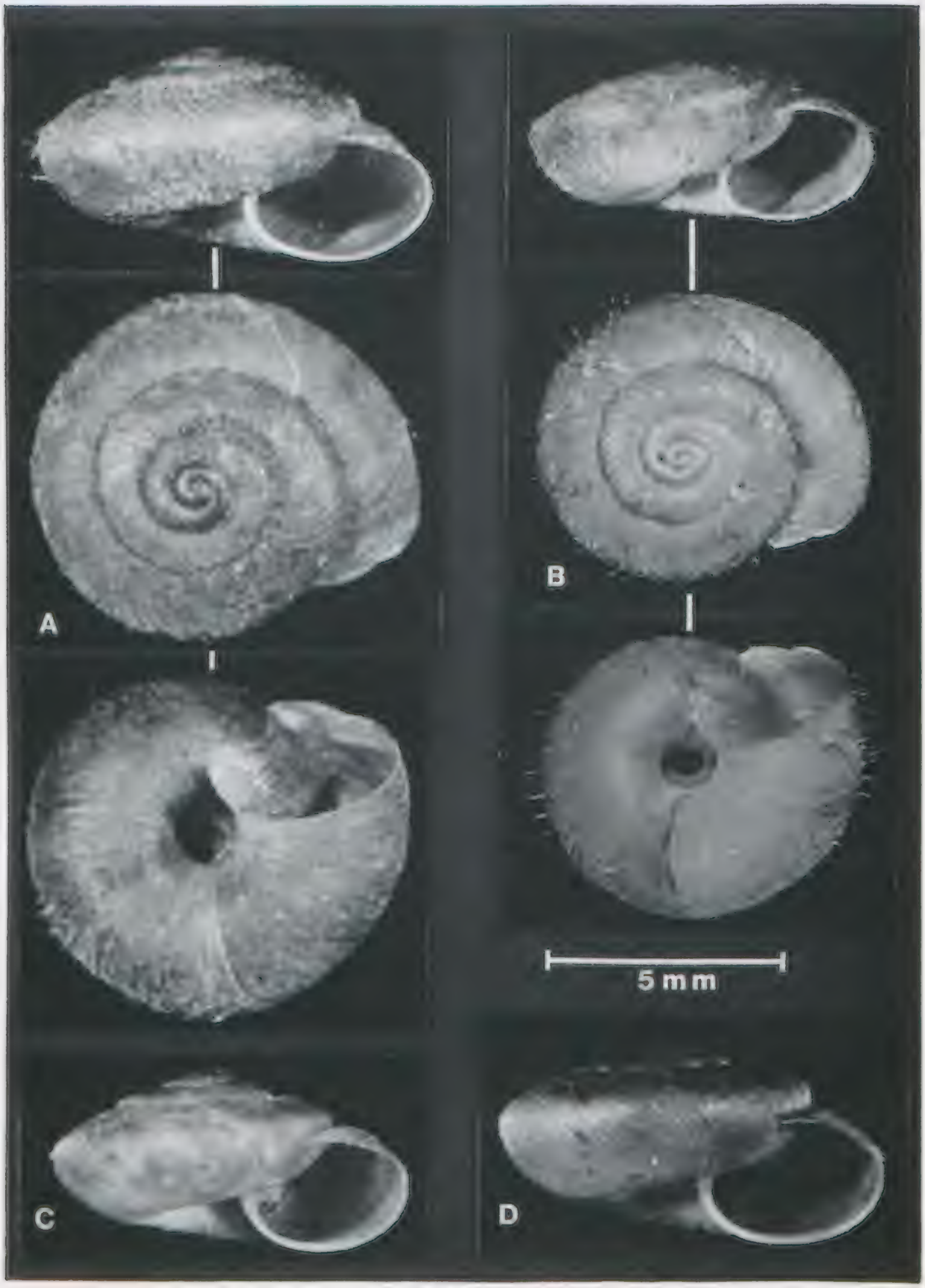

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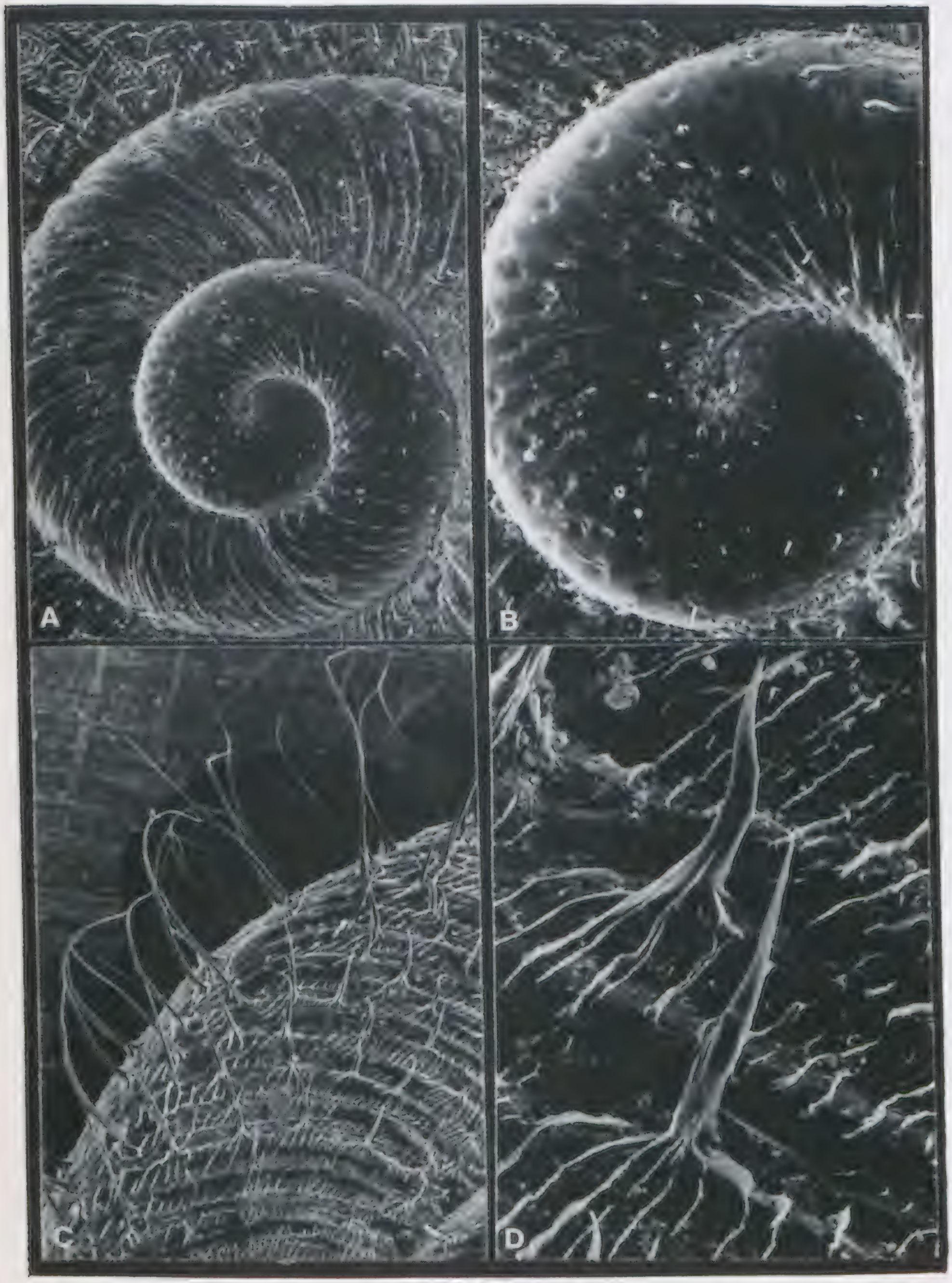

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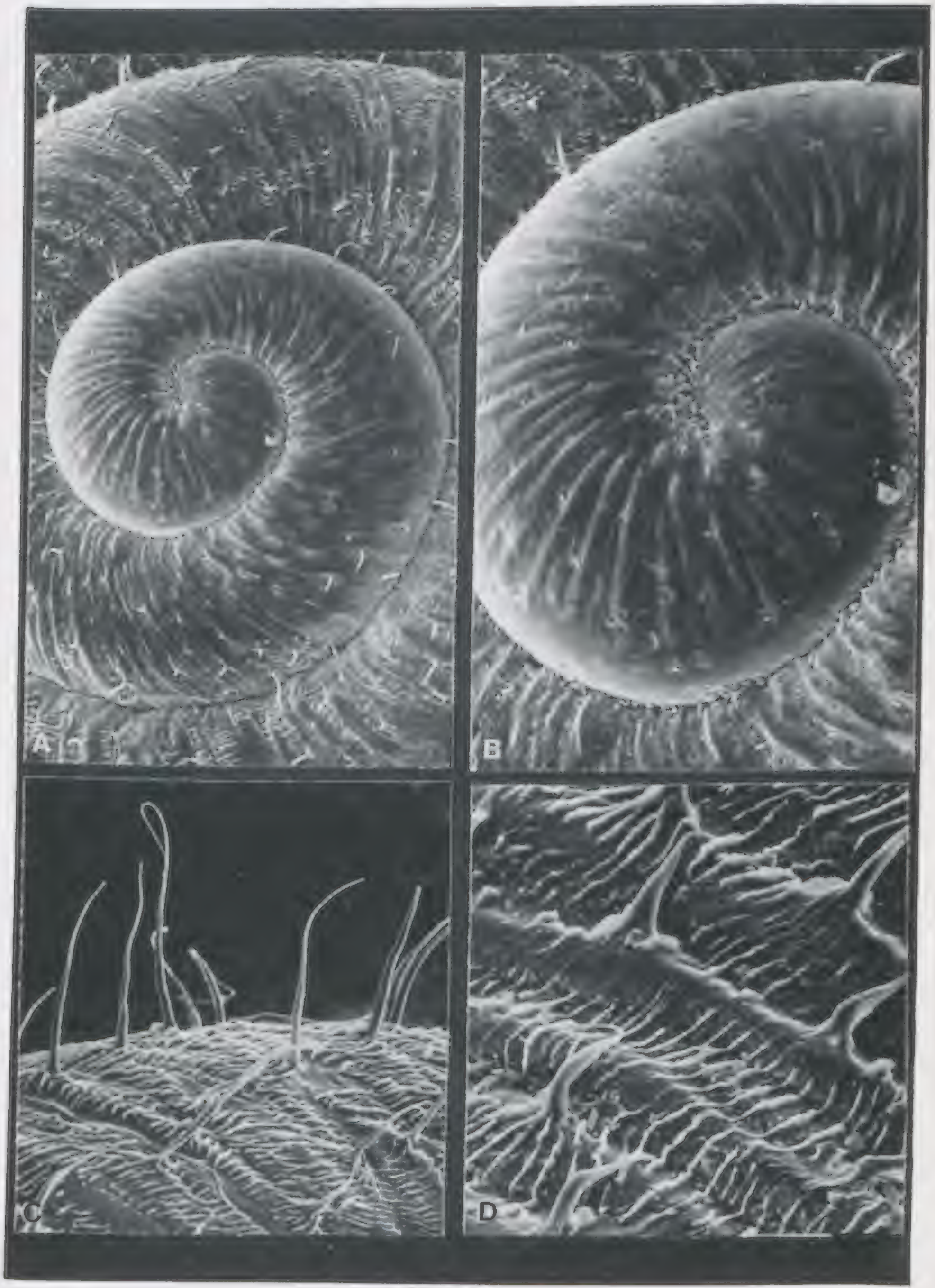

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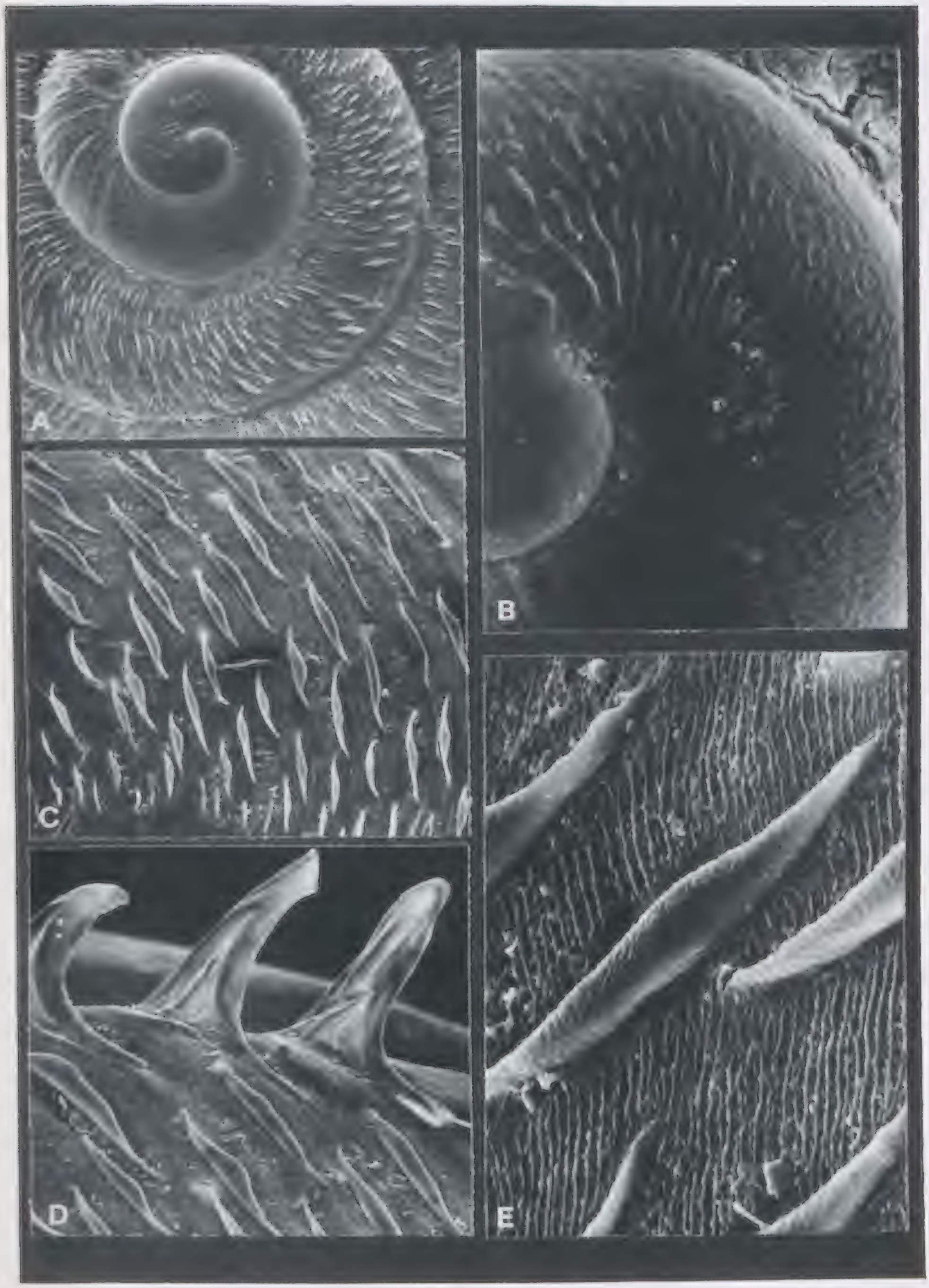

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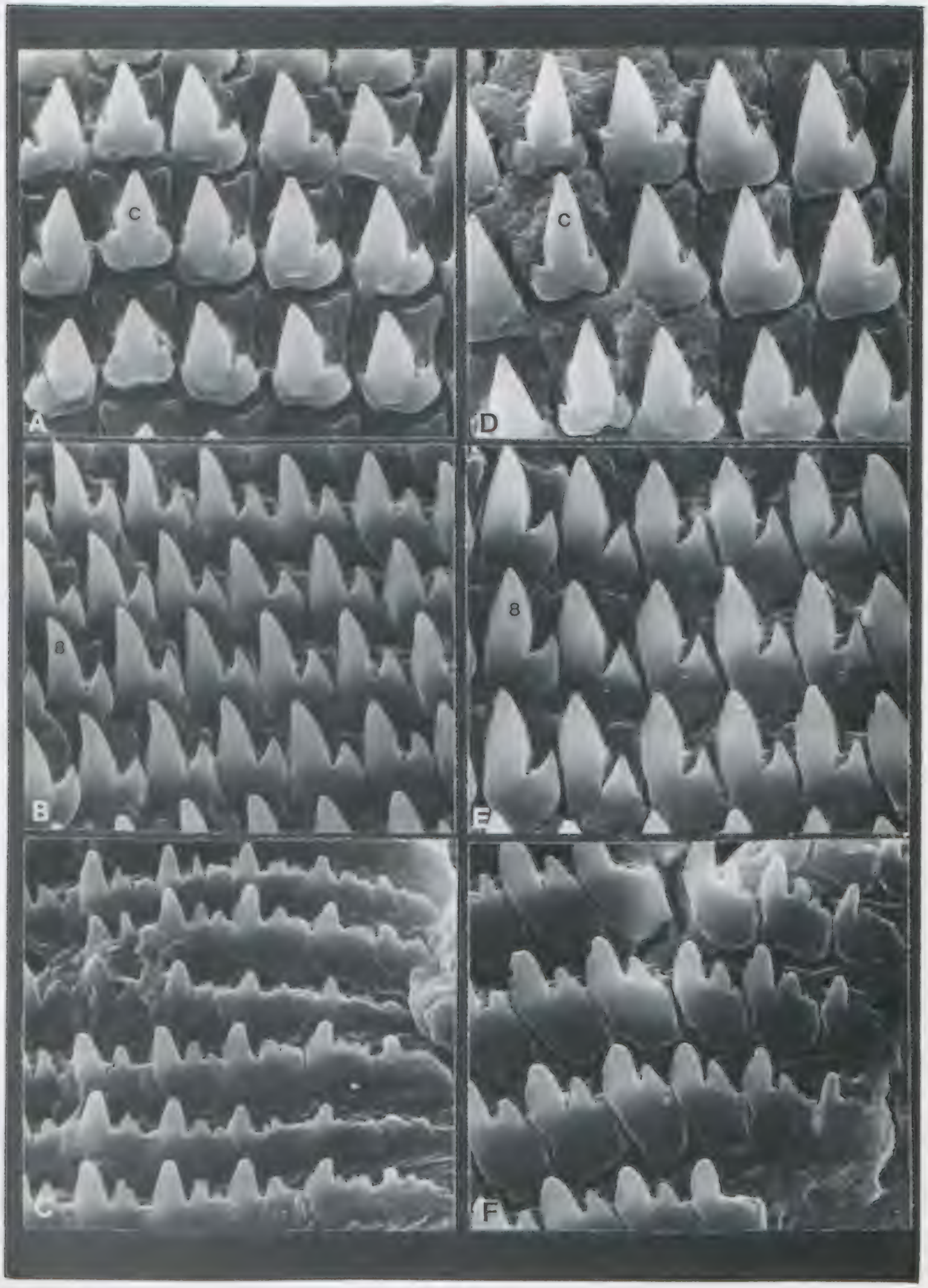

PLATE 15

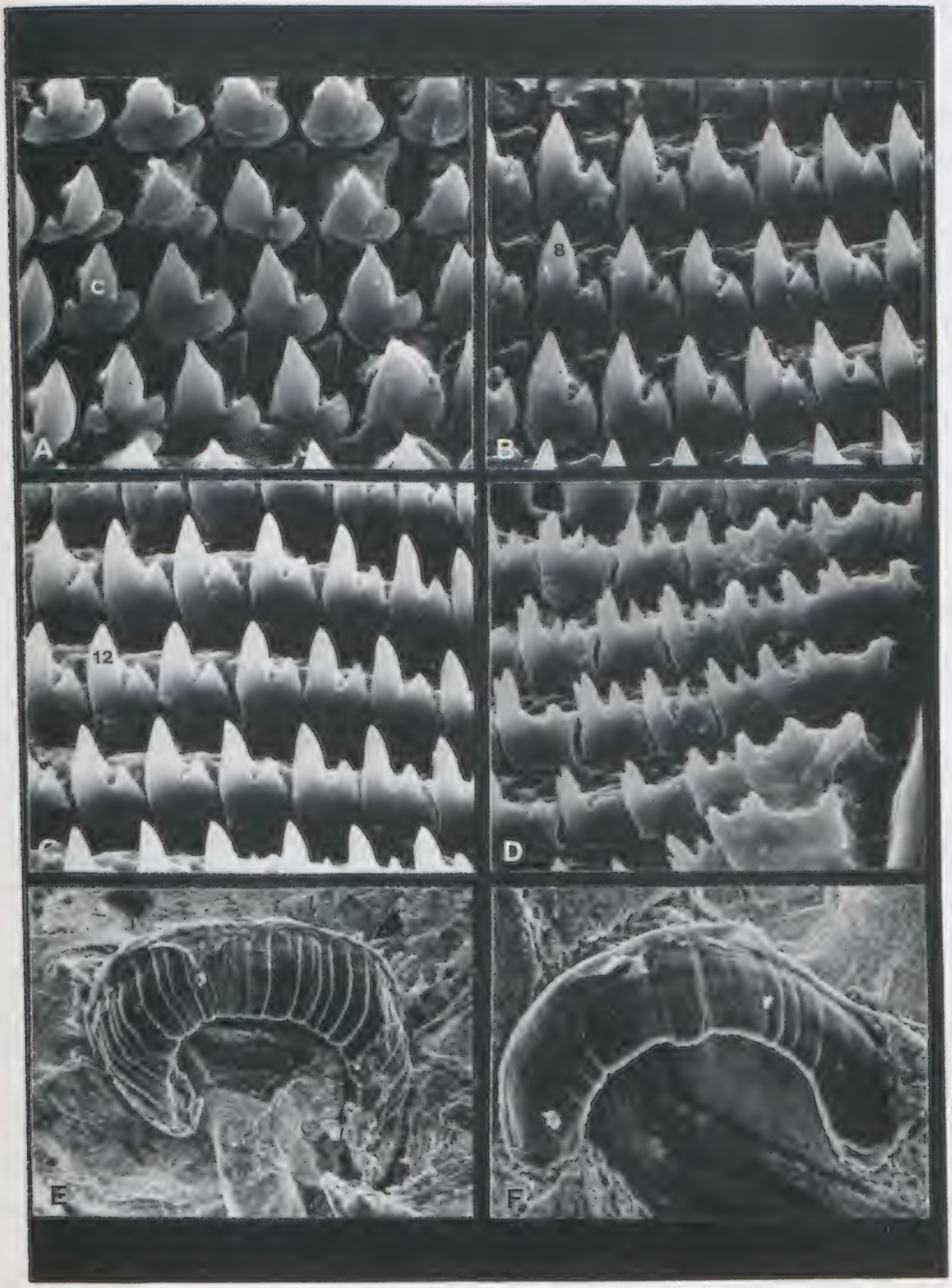

PLATE 16

REVIEW

Molluscs: Prosobranch and Pyrammidellid Gastropods. Alastair Graham, F. R. S. published for The Linnaean Society of London and The Estuarine and Brackish-Water Sciences Association by E. J. Brill/Dr. W. Backhuys, Leiden, 1988. 662 pp, 185 guilders/£57.50. ISBN 90 04 08771 0.

To those acquainted with the study of molluscs both at amateur and professional level, the name of Alastair Graham will be familiar as signifying an expertise on the subject of the Prosobranchia which is rarely equalled at the present time. Together with his colleague, Dr. Vera Fretter, he has worked at Reading University for some 40 years with generations of undergraduates to enhance our knowledge of the animals which comprise these two major groups within the Class Gastropoda. The second edition of Professor Graham's original version of this guide has been eagerly awaited.

Molluscs: Prosobranch and Pyramidellid Gastropods is no. 2 in the New Series of Synopses of the British Fauna, which was originally published by The Linnaean Society. The Synopses were described in the first edition (1971) as being 'field and laboratory books designed to meet the needs of amateur naturalists, sixth-from pupils and undergraduates, though they should also be of value to professional zoologists.' As a matter of general interest, since the publication of Synopsis no. 2, 38 further volumes have been published on a wide range of invertebrate groups, designed to bridge the gap between the popular guide and the more specialist monographs and treatises.

The 1971 edition of the Synopsis under review was a handy-size booklet of 112 pages dealing with 139 species in 48 families. The new version has been greatly expanded to cover 281 species in 59 families, and covers the same geographical area as that used by this Society in its Sea Area Atlas of the Marine Molluscs of Britain and Ireland, with the exclusion of area 48 which includes the Faeroes. The Biology section has been expanded and includes hints on collection and preservation. A series of keys is provided, these being more workable than one key to cover all 281 species. The first key in this edition leads to the identification of non-marine species; for marine species four further keys lead to family and for identification to genus and species, reference must be made to additional keys dispersed appropriately through the text.

The contents of the book are so organized that each species is figured on the right hand page, with the text on the left. The text is headed by the 'currently accepted name' with its author and date. Where different, the original but superseded name and all junior synonyms are listed, these being included (with some unexplained exceptions) in the systematic index at the end of the book. Textual information includes a short section giving diagnostic characters. A fuller description follows giving further shell characters, some features of the animal and information about habitat, food and breeding where this is known. Scant information on distribution is given and it is disappointing to note that some of this has not been brought up to date. For example, *Marstoniopsis scholtzi* is listed in the key as being found 'in canals near Manchester only' whereas records are in print for this species from Norfolk and Suffolk. Similarly, *Truncatella subcylindrica* is described as being 'limited to a part of its original range in Dorset' although sites at Pagham and Warsash have now been recorded.

The most striking feature of this book is the assemblage in one volume of the beautiful drawings of shells by the Danish artist, Poul Winther which serve as an invaluable adjunct to the text for identification purposes. These have been previously published in a series of Supplements to the Journal of Molluscan Studies entitled *The Prosobranch Molluscs of Britain and Ireland*. Issued in nine parts between 1976 and 1986 (with a concluding part containing corrections, additions and an index awaiting publication) some of the earlier Supplements are now out of print. However, the existence of these drawings in published form with a more comprehensive text is a factor which should be borne in mind by a potential purchaser.

Certain corrections have been incorporated into the new Synopsis. Revised drawings have been substituted for *Littorina neritoides* and *Onoba semicostata* and a new figure for *Littorina obtusata* has been included. Mysteriously, *Littorina mariae* remains unfigured. Some of the *Littorina saxatilis* segregates still lack appropriate figures and the diagram illustrating spiral ridges of shells of the *Littorina* species in transverse section which appeared in the appropriate Supplement now carries a corrected heading. Anomalies still exist, however. It has been pointed out to me by Dr. Michael Kerney that the drawing of *Acicula fusca*, published in Part 3 of *The Prosobranch Molluscs of Britain and Ireland* in 1978 and which has been criticized for its inaccurate figuring of the aperture and for the inclusion of a non-existent sutural detail, has been reprinted without alteration. The drawing of *Bithynia leachi* is considered to be poor and does not show the spiral structure of the central portion of the operculum. The drawing of *Pomatias elegans* is inaccurate and no mention is made that this species is now known for Ireland. *Valvata macrostoma*, a threatened rarity and which is to be included in the Red Data Book, carried a perfectly acceptable drawing in the relevant Supplement and although this species is included in the Synopsis, no drawing accompanies the text. Nor is any mention made of the synonym *V. pulchella* which is in wide use on the Continent. Revision of the *Turbonilla* species results in *T. multilirata* and *T. verticalis* being excluded and *T. fulvocincta* being elevated to specific level.

This brings me to the vexed question of nomenclature. Although the Introduction of the book refers to the 'currently accepted name', to the best of my knowledge the nomenclature used has not been previously published as an entity. The most recently published list (*Directory of the British Marine Fauna and Flora – a coded checklist of the marine fauna and flora of the British Isles and its surrounding seas*) edited by Christine Howson and published by the Marine Conservation Society in 1987, contains a Mollusca section largely prepared by Shelagh Smith. However Ponder (1985, *A review of the genera of the Rissoidae (Mollusca: Mesogastropoda: Rissoacea) Records of the Australian Museum (suppl. 4)*) is cited as a reference in the MCS list and also by Graham in the publication under review yet differences occur in suggested nomenclature for this family between the two publications. Indeed, in the first dozen pages of Graham differences with the MCS list are evident, i.e. *Acmaea virginea* of Graham becomes *Tectura virginea* in MCS, *Colisella tessulata* becomes *Tectura testudinalis*, *Patella aspera* becomes *Patella ulyssiponensis* and so on. This will all be very confusing to marine workers and while the experts continue to disagree, those in search of a clearly defined and consistent nomenclature will continue to wonder which names to adopt.

Returning to the format and layout of the book, a degree of ambivalence exists in my mind. Although aesthetically pleasing, the restriction of figures to the right hand page and the text to the left results in many pages where a drawing occupies one third of a page and the text perhaps half a page. There are also twelve blank pages in the book where a figure is lacking or to facilitate the adopted layout. It might be argued that space has been left for a worker's own field notes and sketches but the effect of so much unprinted space is to produce a book some 400 mm thick, which would require a 'pocket' of extravagant proportions! Further, although the Synopses are published with soft covers such a thick paperback is unlikely to prove durable in use and a hard cover would have been advisable.

Molluscs: Prosobranch and Pyramidellid Gastropods encapsulates Professor Graham's life work involving countless hours in the field, laboratory and at the desk. It is very disappointing and a great pity therefore that the book has been priced at a figure which is so excessive as to put it well beyond the reach of so many sections of its potential readership, particularly those workers without easy access to the libraries of the institutions, museums and universities who will be the principal purchasers of this Synopsis.

JANICE M. LIGHT

J. Conch. **33:** 159–164 (1989)

CONTRIBUTION TO THE KNOWLEDGE OF THE TERRESTRIAL MALACOFAUNA OF MACRONISSOS ISLAND (CYCLADES, GREECE)

M. Mylonas[1] and K. Vardinoyannis[1]

(*Accepted for publication, 21st May, 1988*)

Abstract: Macronissos is an island strongly disturbed by human activities. Seventeen species of land snails are distributed on the island. Subfossils found, show that the structure of the malacofauna has recently changed. The distribution of the species in the neighbouring areas does not show any special relation of Macronissos. Only the existence of *Albinaria turrita* on the island, is an indication of Macronissos' closer relation to the Cyclades than to the mainland.

INTRODUCTION

The island of Macronissos is found between the southeast coast of Attika and the Kea island. It has an elongated shape (12·7 km long and 2·6 km wide), an area of 18 km^2 and maximum height 281 m (Fig. 1). The main mass of the island is composed of schists. Limestones are also frequent, especially in the south. From the central mountain crest to the north, the island appears more rocky.

Phrygana is the dominant type of vegetation with *Sarcopoterium spinosum* (Linnaeus), *Genista acanthoclada* De Candolle and *Thymus capitatus* (Linnaeus). There are some places where *Pistacia lentiscus* Linnaeus dominates and some other where *Pinus halepensis* Miller has been recently planted.

The fauna and the flora of Macronissos have been very little studied. The main reason for this, is that the island used to be a camp for political prisoners. After the fall of the military junta, in 1974, the island became open to visitors.

A significant report for the land snails of the island is found in Martens (1889). Data are also found in Hesse (1883), Fuchs & Kaufel (1934, 1936), Heller (1976) and Zilch (1977). There is a total of 7 species reported (Table 1).

We visited the island twice, in November 1981 and in March 1983 and collected specimens from 7 localities. In all seven localities the influence of grazing is high, as the island is nowadays used only for goat and sheep grazing.

In order to compare the malacofauna of the island with the neighbouring areas, we used data given by Mylonas (1982) for Kea and the other Cyclades islands and collected specimens from 4 localities in southeast Attika (Lavrion).

THE MALACOFAUNA

In Table 1 we give the list of species found on the island, the previous bibliographic data and

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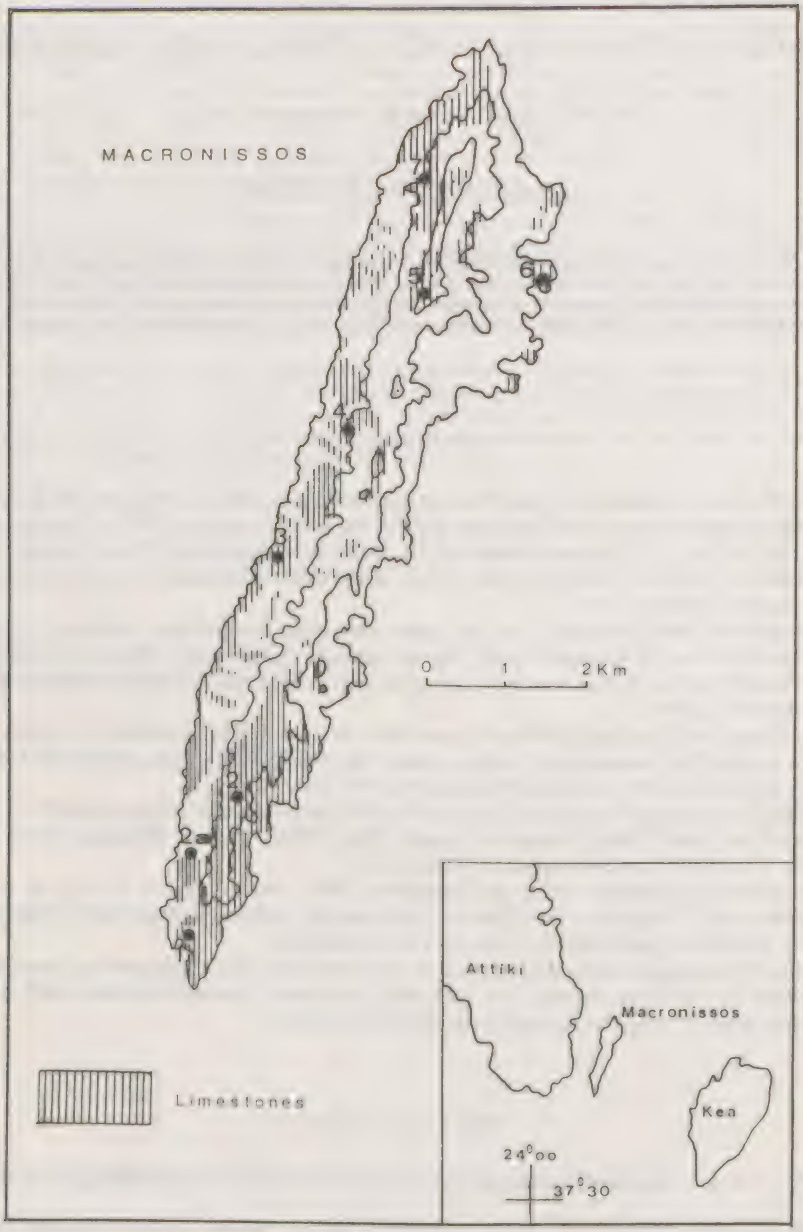

Fig. 1. The island of Macronissos and the collecting localities.

TABLE 1. LIST OF SPECIES FOUND ON MACRONISSOS ISLAND, PREVIOUS BIBLIOGRAPHIC DATA THE DISTRIBUTION ON THE ISLAND AND THE DISTRIBUTION OF THESE SPECIES IN THE NEIGHBOURING AREAS, KEA AND LAVRION.

Species	*Reference*	*Localities*	*Presence in:*	
			Kea Isl.	*Lavrio*
**Helix figulina* Rossmässler, 1839	—	2a	+	+
Eobania vermiculata (Müller, 1774)	Martens (1889)	1,2,3,4,5,6.	+	+
Metafruticicola pellita (Férussac, 1821)	Martens (1889)	1,2,3,4,5,6,7.	−	−
Trochoidea cretica (Pfeiffer, 1821)	Martens (1889) Fuchs & Kaufel (1934)	1,2,2a,3,5,7.	−	+
Trochoidea didyma (Westerlund, 1879)	—	2,2a,3,5.	−	+
Cernuella ionica (Mousson, 1854)	—	1,2,3,4,6.	+	+
Cernuella syrensis (Pfeiffer, 1846)	—	2,5,7.	+	+
Albinaria turrita eumeces (Boettger, 1889)	Hesse (1883) Martens (1889) Zilch (1977)	2,5,7.	+	−
Mastus etuberculatus (Frauenfeld, 1867)	Martens (1889) Heller (1976)	1,2,3,4,5,6,7.	−	−
**Chondrus zebra* (Olivier, 1801)	—	2a	+	+
Rumina decollata truncata (Kobelt, 1897)	Fuchs & Kaufel (1934)	1,2,3,4,5,6,7.	+	+
Eopolita protensa (Férussac, 1821)	Martens (1889) Fuchs & Kaufel (1934, 1936)	1,2,3,4,5,7.	−	+
Oxychilus hydatinus (Rossmässler, 1838)	—	6,7.	+	+
Vitrea clessini (Hesse, 1882)	—	1,2,5.	+	+
Orculella turcica (Letourneux, 1884)	—	2,3,5.	+	+
Granopupa granum (Draparnaud, 1801)	—	1,2,3,4,5,7.	+	+
Rupestrella philippii (Cantraine, 1840)	—	7.	+	+
Cecilioides acicula (Müller, 1774)	—	2,3,5.	+	+
Deroceras laeve (Müller, 1774)	—	3,5,6.	+	+

* Subfossil shells only.

the appearance of the species in all 7 localities and the neighbouring areas.

Remarks for some interesting species are given below:

1. *Metafruticicola pellita* (Férussac, 1821) Pl. 17, fig. a. The island's form has the smallest dimensions, diameter (D) = 12·1±0·9 mm, height (H) = 7·6±0·6 mm and 5 whorls compared with the forms from Anaphi (D = 13·6, H = 8·1, 5 whorls) Syros (D = 14·5, H = 8·3, 5·2 whorls) and Lemnos (D = 13·5, H = 8·0, 5·2 whorls), given by Fuchs and Kaufel (1936). According to the reproductive system (Fig. 2B), the Macronissos' form, lies within the variation of what Fuchs and Kaufel (1936) give for the subspecies *Metafruticicola pellita kreglingeri* (Kobelt) based on anatomical work from Anaphi and Lemnos (epiphallus 7–11 mm, flagellum 10·5–17 mm, bursa copulatrix 15·5–22 mm). The Macronissos' form is closer to that of Lemnos because of its small vagina, 1–2·5 mm and long free oviduct, 6–8 mm.

2. The Helicellinae of the Aegean need a general revision at the species and genus level, as most of the determinations based only on characteristics of the shell are not reliable. We identify 4 species based on the characteristics of the reproductive system and of the shell.
a). *Trochoidea cretica* (Pfeiffer, 1821) Pl. 17, fig. b. Martens (1889) and Fuchs and Kaufel (1934) report from the island the subspecies *Trochoidea cretica cauta* (Westerlund, 1879). Some of the shells of the locality 5 reach the characteristics of this subspecies, but as *T. cretica* has not yet been divided into clear and convincing subspecies we cannot, at the present, separate the different forms.
b). *Trochoidea didyma* (Westerlund, 1879). Pl. 17, fig. c. It differs from the above species, because it has more globular shell and round apperture. The deep suture gives in some shells a characteristic scalare form. In the reproductive system the mucus glands have very few branches, 2–4.

c). *Cernuella ionica* (Mousson, 1854) Pl. 17, fig. d.
d). *Cernuella syrensis* (Pfeiffer, 1846). Pl. 17, fig. e. The form found on the island is not very depressed and reminds the form of the species that is distributed in the island of west Cyclades, Kea and Kythnos.

3. *Mastus etuberculatus* (Frauenfeld, 1867). The appearance and the dimensions of the shell are within the variation of the species mentioned by Heller (1976). The reproductive system (Fig. 2A) is quite peculiar, because in all the dissected specimens we found no diverticle in the bursa copulatrix. On the other hand in dissected specimens of more than 70 populations from 32 Aegean islands, the diverticle is always present. But as we agree with Forcart (1940), that the missing diverticle must not be overestimated in the family of Enidae, we believe that this character of Macronissos form has no special taxonomic value.

4. *Rumina decollata truncata* (Kobelt, 1897). Dense populations of this subspecies are found especially in the west of the island (12 individuals/m). They have a mean shell diameter of 7·7 mm, a mean shell length of 21·4 mm and 5·6 whorls.

5. *Orculella turcica* (Letourneux, 1884). Based on the shell, we can say that the specimens found in Macronissos are the same or almost the same with other of the central and south Greece, that many scientists named *Orcula doliolum turcica* (Letourneux). But the reproductive system of the species from Macronissos and other places in central and south Greece with a penial appendix always present, (Fig. 2C) shows that we have to deal with the genus *Orculella* Steenberg, 1925. We believe that in this species the name *Orculella turcica* (Letourneux) should be given.

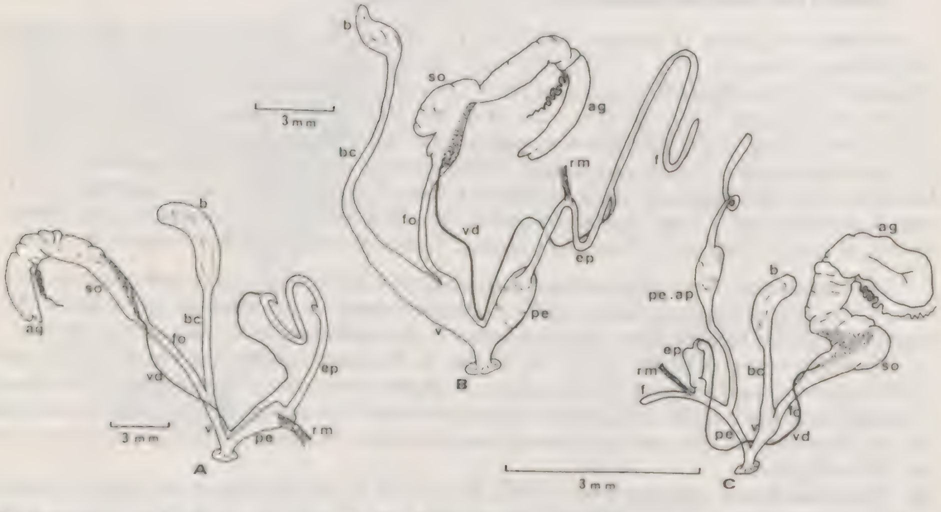

Fig. 2. Genitalia of: A. *Mastus etuberculatus*, B: *Metafruticicola pellita* and C: *Orcullela turcica*.
ag: albumen gland, b: bursa, bc: bursa copulatrix, ep: epiphallus, f: flagellum, fo: free oviduct, pe: penis, pe.ap: penial appendix, rm: retractor muscle, so: spermoviduct, v: vagina, vd: vas deferens.

Subfossils

In the southwest part of the island, locality 2a, and among Quaternary sandstone sediments and slope deposits, we found a lot of subfossil shells that belong to the species: *Helix figulina*, *Trochoidea cretica*, *Trochoidea didyma* and *Chondrus zebra*.

The species *H. figulina* and *C. zebra* are not found today on the island, though they do exist in Lavrion and Kea island, in similar biotopes with Macronissos. On the contrary, species with a wide distribution and dense populations of the recent malacofauna of Macronissos such as *Metafruticicola pellita*, *Eobania vermiculata*, *Rumina decollata* and *Mastus etuberculatus* do not appear in the subfossil layer. We can support that the structure of the recent malacofauna in Macronissos has changed compared with the recent past, not because of a change of the climatic conditions or the vegetation, but because of the introduction of new species.

DISTRIBUTION

Though the island is characterized by a relative uniformity of its biotopes, there are species with special requirements that appear only in restrict, differentiated biotopes. Thus, *Rupestrella philippii* is found only on the north side, locality 7, of the island, where calcareous rocks appear. *Oxychilus hydatinus* is found in a small coastal prairie, locality 6 and in a shady place in locality 7. *Albinaria turrita* is distributed only in biotopes (2, 5, 7) where limestone areas occur. In biotopes with a strong influence of man the dominant species are: *Metafruticicola pellita*, *Eobania vermiculata*, *Rumina decollata* and *Eopolita protensa*.

Comparing the malacofauna of Macronissos, with those of Kea and Lavrion, we conclude that:

11 species are distributed in all three areas,
14 species are distributed in Macronissos and Lavrion,
12 species are distributed in Macronissos and Kea.

2 species, *M. etuberculatus* and *M. pellita*, which appear in Macronissos are not found in the other two neighbouring areas. The existence of these two species in the island, must be attributed to human activities as the density of their populations in the biotopes of Macronissos is proportional to the influence of man.

According to Mylonas (1984) in areas where the fauna is strongly disturbed by human influence, only local endemic species give reliable evidence for biogeographical conclusions. In Macronissos only 1 species can be characterized as a local endemic: *Albinaria turrita*. The distribution and the differentiation of this species only in the islands of the western arc of the Cyclades offers us an indication that Macronissos should be placed within this group.

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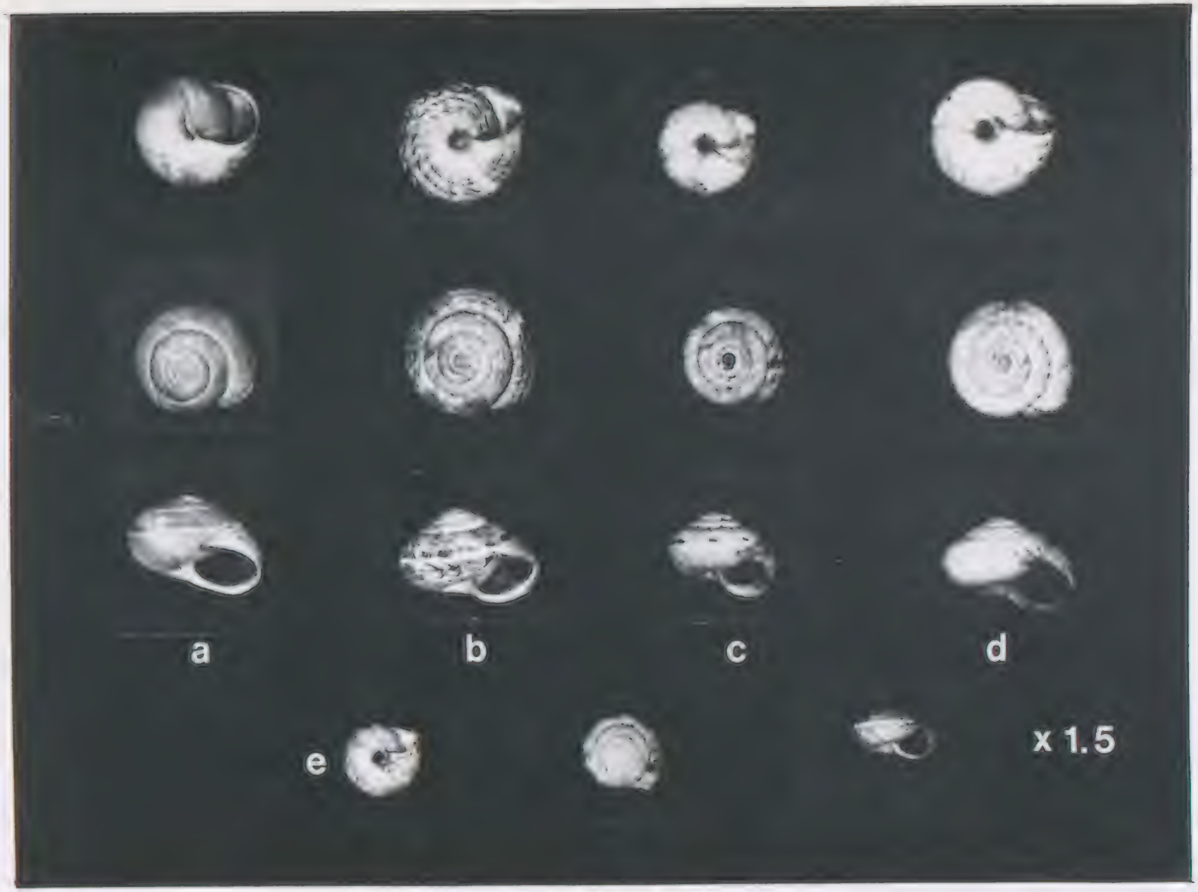

PLATE 17

a: *Metafruticicola pellita*, b: *Trochoidea cretica* c: *Trochoidea didyma*, d: *Cernuella ionica*, e: *Cernuella syrensis*.

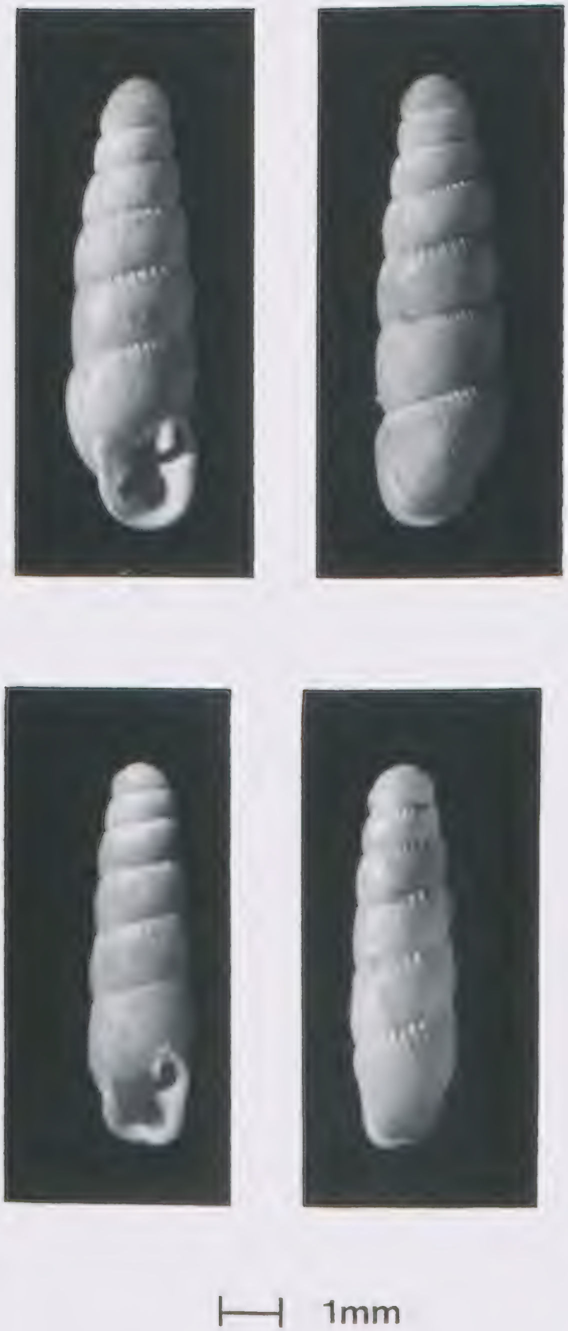

PLATE 18

J. Conch. **33:** 165–168 (1989)

GULELLA BICOLOR (HUTTON) AND ITS IMPLICATIONS FOR THE TAXONOMY OF STREPTAXIDS

Fred Naggs[1]

(*Accepted for publication, 26th November, 1988*)

Abstract: Uncertainty regarding the geographical origin of *Gulella bicolor* is reflected in doubt as to its generic status. This serves to exemplify that geographical criteria provide an unsatisfactory basis for assigning generic groupings to streptaxids.

INTRODUCTION

The Streptaxidae are a group of carnivorous pulmonate land snails widely distributed in the tropics and some subtropical areas; following Baker (1963) they are currently recognized as the sole family in the Streptaxacea. They are notably absent in the Pacific region east of a line from Southern Japan to Sulawesi and south from a line running between Sumatra and Java. There are many species, possibly in excess of one thousand, with over half their number occurring in tropical Africa. Although there may be an abundance of shell characters which allow discrimination of species, many generic groupings are of doubtful value. Two, possibly unnatural, subfamilies are currently recognized. The Streptaxinae vary from bulimiform to almost discoid, often with an assymmetric adult shell and occur throughout most of the range for the family, including South America; the Enneinae are composed of a large number of pupiform and turriform streptaxids ranging from the Ethiopian to the Oriental regions with a single species in the Canary Islands.

Geographical criteria have been widely used to reduce the large number of species into manageable units at generic level. For example, within the Enneinae, this particularly applies to subgeneric groups of *Gulella* and allied genera but there appears to be little basis for accepting many of these groups as anything other than units of convenience. Furthermore, there is a danger that such taxa can become accepted dogma and used to justify secondary conclusions, even though there are no recognized characters that permit discrimination. Van Bruggen and Minato's (1977) assertion that species of *Gulella* from the Ethiopian Region are fundamentally different from Oriental forms is contradicted by the difficulties experienced with *Gulella bicolor* (Hutton).

Gulella bicolor (Hutton)

Hutton (1834, pp. 86, 93) described *Pupa bicolor* from a series collected in Mirzapore and between Agra and Neemuch along the Ganges Plain in India (Pl. 18). Apart from its taxonomic interest this small predatory snail has received attention for two other reasons.

PLATE 18

Two of four possible syntypes of *Gulella bicolor* (Hutton) in British Museum (Nat. Hist.). Presented by Captain T. Hutton, locality: 'Mirzapore and Agra'. reg. no. 1856.9.15.75. Mag. ×10. Nine additional specimens in the collections of the Zoological Survey of India, Calcutta, may also be syntypes.

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[1] British Museum (Nat. Hist.) London SW7 5BD

Firstly it has been inadvertently introduced in many areas of the tropics and subtropics, and its range appears to be actively expanding. Secondly, it feeds on soft-bodied invertebrates including the pest snails *Allopeas gracilis* (Hutton), *Subulina octona* (Bruguière) and juveniles of *Achatina fulica* Bowdich. *Achatina fulica* is a serious pest (Mead 1961, 1979) and *G. bicolor* has been introduced as a biological control agent in Hawaii (Krauss 1964) and the Andamans (Srivastava 1968). It has not proved to be an effective control agent (Mead 1979) but neither has it caused the devastation to endemic faunas such as that caused by the rapacious predatory snail *Euglandina rosea* (Férussac).

Interpretations of the nomenclature, geographical origin and relationships of *Gulella bicolor* interact to give a very confused history for this species. Pfeiffer (1856) included *Pupa bicolor* in *Ennea (Huttonella)* and Stoliczka (1871, p. 169) designated it the type species of *Huttonella* (*Ennea* H. & A. Adams 1855 is currently restricted to tropical African taxa allied to the type species *Pupa elegantula* Pfeiffer., see: Pilsbry 1919, p. 214). Stoliczka's choice of words 'If we consider *E. bicolor* Hutton as the type of *Huttonella*. . . .' might be construed as equivocal and coming within the terms of Article 67 (c) (3) (ICZN, 1985), in which case Nevill's (1878, p. 6) designation of *H. bicolor* would seem to resolve the question of type species. This has been overlooked by some workers and Bourguignat's (1889, p. 126) designation of *Pupa kraussi*, from Natal, South Africa, as the type of *Huttonella*, has become entrenched in the literature following the use of Zilch (1960, p. 570).

Distribution

Despite *Gulella bicolor* having been first described from India, its Indian associations have often been thought of as secondary and an African or western Indian Ocean island origin considered more likely. Kobelt (1904, p. 127) and Van Benthem Jutting (1961, p. 8) have probably been the most influential proponents of this view. Dundee & Baerwold (1984, p. 63), perhaps following Bourguignat's mention of the Seychelles as the locality of the species (1889, p. 123), give the Seychelles as the type locality. In fact, and as noted by Benson (1849) and Blanford & Godwin-Austen (1908), *Gulella bicolor* is widely distributed in India south of the Himalayas and is also widespread in Sri Lanka, and Burma. Additional records in the Oriental region are more patchy but include the Andaman and Nicobar Islands and extend to Malaysia and Singapore (Van Bentham Jutting 1961), the Philippines and Indonesia (Van Benthem Jutting 1950), SE China (Yen 1939) and Japan (Azuma 1982).

References to an African distribution persist (eg. Stanisic, 1981) but such comments are probably due to the perpetuation of mistaken assumptions based on supposed African affinities. There appears to be just one documented record from Africa, a single lot from Mombasa, Kenya in the Museum of Comparative Zoology at Harvard (Clench 1964), and Mordan (1988) gives two records from Oman, Arabia, both of which he considered to have been introduced. Specimens from some western Indian Ocean islands are represented in European museums but they suggest localized distributions. For example, Lionnet (1984), referring to *Ennea bicolor* as an exotic species from India and Sri Lanka, gives the Seychelles distribution as limited to Mahé Island. Nevill (1869, p. 64) gives a record 'from Mahé, near Port Victoria, in the cinnamon groves', and Van Bruggen (in litt.) believes that all subsequent references to a Seychelles locality 'most likely do not refer to actual specimens but rather to Nevill's paper'. I have identified a shell of *Gulella bicolor* collected from the Bel Air area of North Mahé by J. Gerlach in 1987 and so it might be supposed that although the species still survives locally on the island it is not native to the Seychelles.

Records from Caribbean islands (Van der Schalie 1948) include records based on early reports such as that of Guppy (1866) indicating a very localized occurence. Other Neotropical records include Venezuela (Van Benthem Jutting 1950), Brazil (Pilsbry 1926) and French Guiana (Tillier 1980). Some North American records are given by Dundee & Baerwold (1984) and Littleton (1975) notes the occurrence in Texas; a recent record from

Queensland, Australia, is given by Stanisic (1981). There seems little distributional evidence to suggest anything other than an Indian Subcontinent origin with an actively expanding range and it is interesting to note that, outside of this region, records appear to be confined to synanthropic and usually coastal localities.

Generic Status

Nevertheless, with what have been perceived as ambiguous geographical associations, there has been no consensus in assigning *Gulella bicolor* to a generic-level group. Should the affinities of *Gulella bicolor* lie with African species such as *Gulella kraussi* or with Oriental forms currently placed in *Sinoennea* Kobelt 1904, *Indoennea* Kobelt 1904 and *Diaphera* Albers 1850? Geographical criteria might point to Oriental associations but are these Oriental genera sound taxonomic units?

Clear generic distinctions based on the type species of these Oriental genera are not so robust when additional species are considered. Peile (1935) synonymized *Indoennea* with *Sinoennea* but Zilch (1960, 1961) preferred to retain *Indoennea* as a subgenus of *Sinoennea*. As *Gulella bicolor* is the type species of *Huttonella*, a name that has priority over these two Oriental genera, its relationships also have nomenclatural significance at generic level if *Gulella* is to be used in a restricted sense. So far, there appear to be no anatomical criteria to separate *Gulella bicolor* from *Sinoennea* or *Indoennea*. Van Benthem Jutting (1961, p. 8) did state that 'contrary to . . . *Sinoennea* the immature shells of *Huttonella bicolor* never possess any teeth in the aperture'. However, Van Bruggen (in litt.) informs me that in his opinion 'this is not true; juveniles with and without teeth in the aperture are to be found throughout all genera of the family and I think this character does not carry any weight at all, except perhaps on a specific level (at the most)'.

Streptaxids have a fossil record dating from the Mesozoic (Solem 1979) and, within the Enneinae, a single genus, *Gibbulinella* Wenz, is recorded from the Eocene of Portugal and, as an extant species, *G. dealbata* (Webb & Berthelot), in the Canary Islands. Connolly (in BM(NH) collections) identified Miocene *Gulella* from Koru, East Africa as being conspecific with an extant species *G. ugandensis* (Smith) and Verdcourt (1963) recorded several species of Miocene *Gulella* that differ little from living species. It is clear that a number of streptaxid clades, showing very similar form, may have vicariant representatives throughout the tropics. There are few shell characters of taxonomic value at generic level, and the very few species known anatomically do not afford a sufficient basis for a systematic revision. Thus, there will be little scope for distinguishing similarity through common ancestry from homoplasy until more taxa are known anatomically, and systematic groups of streptaxids established purely on geographical criteria have doubtful value as phylogenetic entities. As taxonomic units they serve only to obscure an interesting and challenging problem.

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J. Conch. **33:** 169–172 (1989)

DESCRIPTION OF A NEW *ACANTHOCHITONA* SPECIES (POLYPLACOPHORA) FROM THE RED SEA

Hermann L. Strack[1]

(*Accepted for publication, 26th November, 1988*)

Abstract: *Acanthochitona mastalleri* is described as a new species from the northern Red Sea, its taxonomic position is discussed.

INTRODUCTION

In 1985 Dr. E. Rolan (Vigo, Spain) sent me several chiton shell valves and a complete (but rolled up) specimen which he collected in Al Aqabah, Jordan and which appeared to belong to a previously unknown *Acanthochitona* species. In order to collect material for a revision of the whole Red Sea Polyplacophora fauna, I visited Egypt in January 1987. Here a large number of chitons was gathered. Among these, eleven additional specimens of the above species were collected. Later that year I examined the chitons collected by Dr. M. Mastaller in the Red Sea, which are partly stored in the Koninklijk Belgisch Instituut voor Natuurwetenschappen (= KBIN) in Brussels. These chitons were previously studied by the late Dr. E. Leloup (KBIN) around 1977–1978. Among the material he studied were two specimens of the new species. Although Leloup named them *Acanthochitona mastalleri* in a brief manuscript description, the results of his studies were never published.

To credit both Mastaller (the first collector of this species) and Leloup (who first recognized its true taxonomic status), I will retain the name given by Leloup and used in Mastaller's thesis (1979, p. 25).

SYSTEMATICS

Acanthochiton mastalleri n. sp. (Fig. 1, Pls. 19, 20)

Type material

Holotype: EGYPT, Merlin Point (4 km, south of Hurghada), 25/27.I.1987, H. L. Strack leg., length 15·8 mm, width 8·9 mm, flat and preserved in alcohol, colln. Zoological Museum Amsterdam (= ZMA) no. Moll. 388029.

Paratypes: EGYPT. Merlin Point (4 km. south of Hurghada), 25/27.I.1987, H.L. Strack leg., 1 specimen colln. Strack no. 1276; 6 km north of Hurghada, 28.1.1987, H. L. Strack leg., 9 specimens colln. Strack no. 1277; JORDAN, Al Aqabah, IV.1982, E. Rolan leg., 1 specimen and 2 valves colln. Rolan, 5 valves colln. Strack no. 1278; 11–12 km. south of Al Aqabah, 1975–1977, M. Mastaller leg., 1 specimen colln. KBIN no. IG 26.374, 1 specimen colln. Bochum University.

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Diagnosis

Animal of moderate size (Fig. 1) up to 16 mm in length, 9·5 mm in width, little elevated (height/width quotient valve 4: 0·3). Girdle very wide, strongly encroaching at the sutures, densely covered with small spicules and with 18 rudimentary tufts. Tegmentum largely reduced, with round to oval granules. Jugum narrow and sharply separated from the latero-pleural areas.

Description

Head valve (Pl. 19, fig. 2) broadly semicircular, sculptured with irregular, more or less oval, flat-topped to slightly concave granules. Insertion plate very long with the usual five slits.

Intermediate valves (Pl. 19, fig. 3) wing-shaped, length/width quotient of valves 4 and 5 about 0·6. Posterior margin concave with prominent apex. Jugal sinus wide, convex in II, concave in III–V and more or less straight in VI–VIII. Jugal area raised, narrow, sharply separated from the latero-pleural areas and sculptured with about 4–7 striae. Anterior end of the jugum often protruding the sinus. Latero-pleural areas much reduced, their anterior margins deeply concave, tegmentum with oval or drop-shaped granules arranged in curved series radiating from the apex. Only one series of granules on each side of the jugum reaching the anterior margin. In juvenile or semiadult specimens these series even fail to reach the anterior margin. Granules are small near the jugum, becoming larger (100–140 × 60–80 μm, measured in two specimens of 9·6 and 11·5 mm length) towards the outer margins. Each granule has a megalaesthete accompanied by about two (near the jugum) to four microaesthetes. Apophyses extraordinarily large, projecting for- and backwards, even extending to about halfway behind the posterior margin of the latero-pleural areas. Insertion plates with 1–1 slits.

Tail valve broad (Pl. 19, fig. 4), ante-mucronal area reduced as in intermediate valves. Mucro prominent, behind centre, posterior slope straight to concave. Apophyses wide, more or less triangular, wing-like with two slits.

Colour of tegmentum whitish maculated with brown or grey, granules white. Articulamentum white with occasional some brown spots on the jugal area.

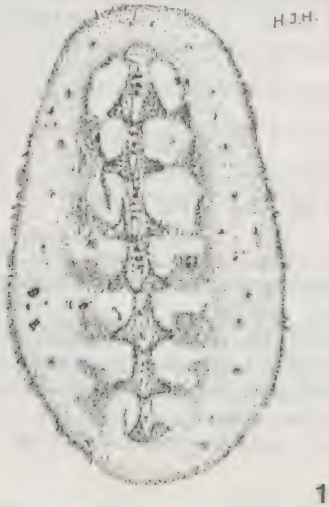

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Fig. 1. *Acanthochitona mastalleri*, holotype (ZMA), whole specimen, dorsal view, 4.5x.

Girdle very extensive, encroaching largely at the sutures. Colour whitish to yellowish mottled with brown, sometimes with green or orange. Dorsally the perinotum is velvety, densely covered with minute, cylindrical, smooth spicules, 20–40 μm long, 5–7 μm thick, of which the smallest are abruptly and very sharply pointed (Pl. 20, fig. 5). These are interspersed with straight or slightly curved, longer, smooth spicules (Pl. 20, fig. 6), 70–100 μm long. Both types of spicules are in many places arranged in such a way, that it leaves small, round, open spaces with no spicule covering at all (about 30 μm in diameter). These open spaces were, strangely enough, not seen during observation of another specimen with the Scanning Electron Microscope. The 18 tufts (Pl. 20, fig. 6) are poorly developed (almost inconspicuous) and consist of about 15–20 long, slender spines, up to 500 μm in length. There is a marginal fringe of smooth or weakly striated, slightly curved spines up to 400 μm long, 18–25 μm thick. The ventral scales (Pl. 20, fig. 7) are, elongate, flattened, smooth, straight and sharply pointed, mostly 40–70 μm in length, up to 90 μm near the outer margin.

Gills are abanal and merobranchial, ranging from 10 to 16 pairs.

Radula of 9·6 mm long paratype has 25 rows of mature teeth (length radula 3·1 mm = 32% of total body length). The major lateral teeth with a tridentate head, denticles sharp, the central one largest (Pl. 20, fig. 8).

Distribution

Up to now *A. mastalleri* is only known from the northern Red Sea; where it has been found around Hurghada (Egypt) and Al Aqabah (Jordan). Probably this is an endemic species as it is not recorded from studied areas bordering the Red Sea like Somalia (Ferreira 1983) and Oman and the Arabian Gulf (Kaas & Van Belle 1988). More research and collecting has to be done to obtain a better understanding of its distribution.

Habitat

A. mastalleri is a shallow water species that lives under stones, dead coral and shells from the low tide mark up to a depth of 0·5 m under mean low tide level. Mastaller (1979, p. 25) makes the following remarks about the habitat of this species: 'Mikroatollzone, unter losen Felsplatten, unter Mikroatollen, selten'. On page 254 he gives a relative abundancy of $0.1/\text{m}^2$ for the 'Mikroatollenzone' and states as microhabitat 'Hohlenkehle an Basis'.

Observations

This very peculiar species can be easily recognized and separated from all other known members of the genus. Three other species of *Acanthochitona* do occur in the Red Sea: *A. penicillata* (Deshayes, 1863), *A. nierstraszi* (Sykes, 1907) and *A. curvisetosus* Leloup, 1960. The taxonomic position of *A. nierstraszi* is still uncertain. This species could be conspecific with *A. penicillatus*, but so far the type material of this species, which is presumably stored in the British Museum (Natural History), could not be found (Mrs. S. Morris, pers. comm.). *A. mastalleri* differs from these species in having an extraordinarily expanded perinotum and consequently a very reduced tegmentum, with markedly concave anterolateral margins. Furthermore the jugal area is narrower and the tufts of spicules on the girdle are much smaller than in these three species.

At first sight *A. mastalleri* gives the impression to belong to the genus *Notoplax* or *Cryptoconchus* rather than to *Acanthochitona*. The slitting in head- and tail valve however is decidedly Acanthochitonoid and therefore it must be regarded as an extreme form within the genus *Acanthochitona*.

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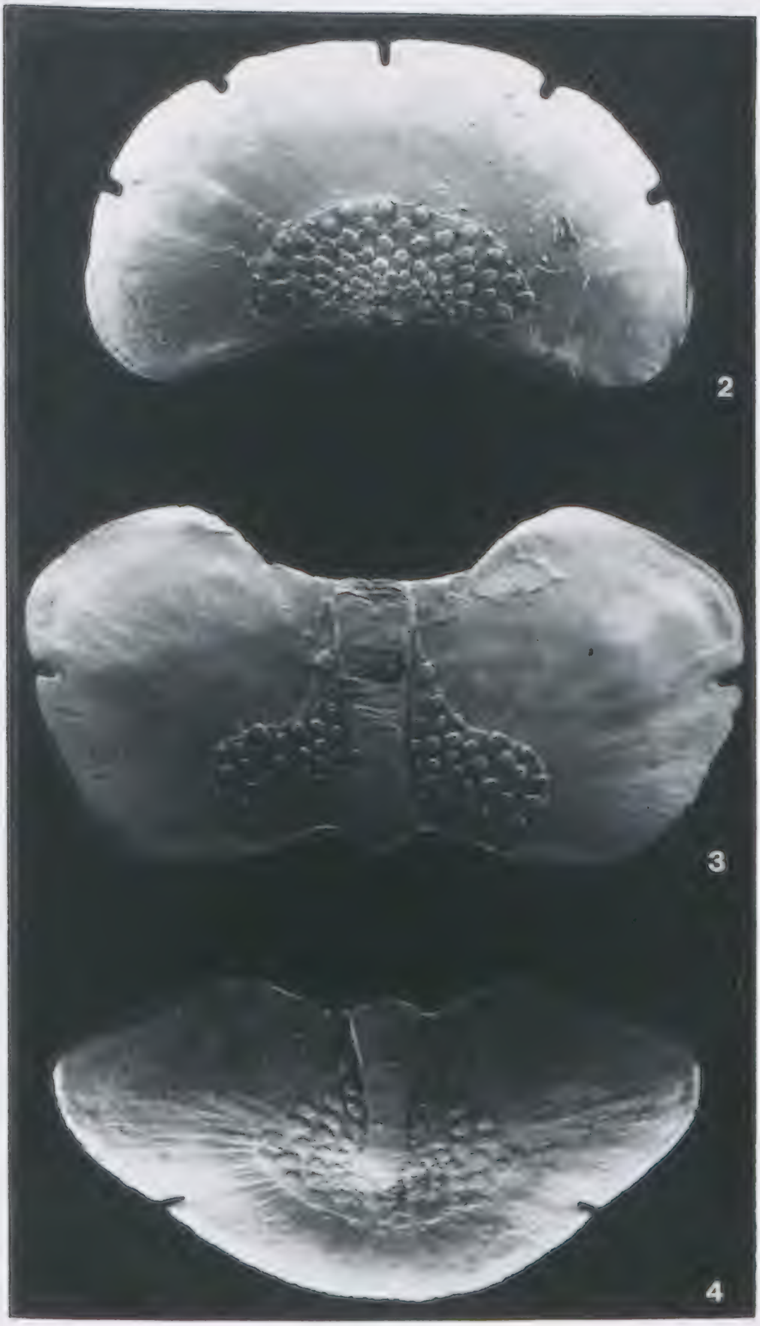

PLATE 19

Figs. 2–4. *Acanthochitona mastalleri*, paratype, Egypt, 6 km. north of Hurghada, colln. Strack no. 1277; (2) head valve, 27.9x; (3) valve V, 24.2x; (4) tail valve, 25.6x.

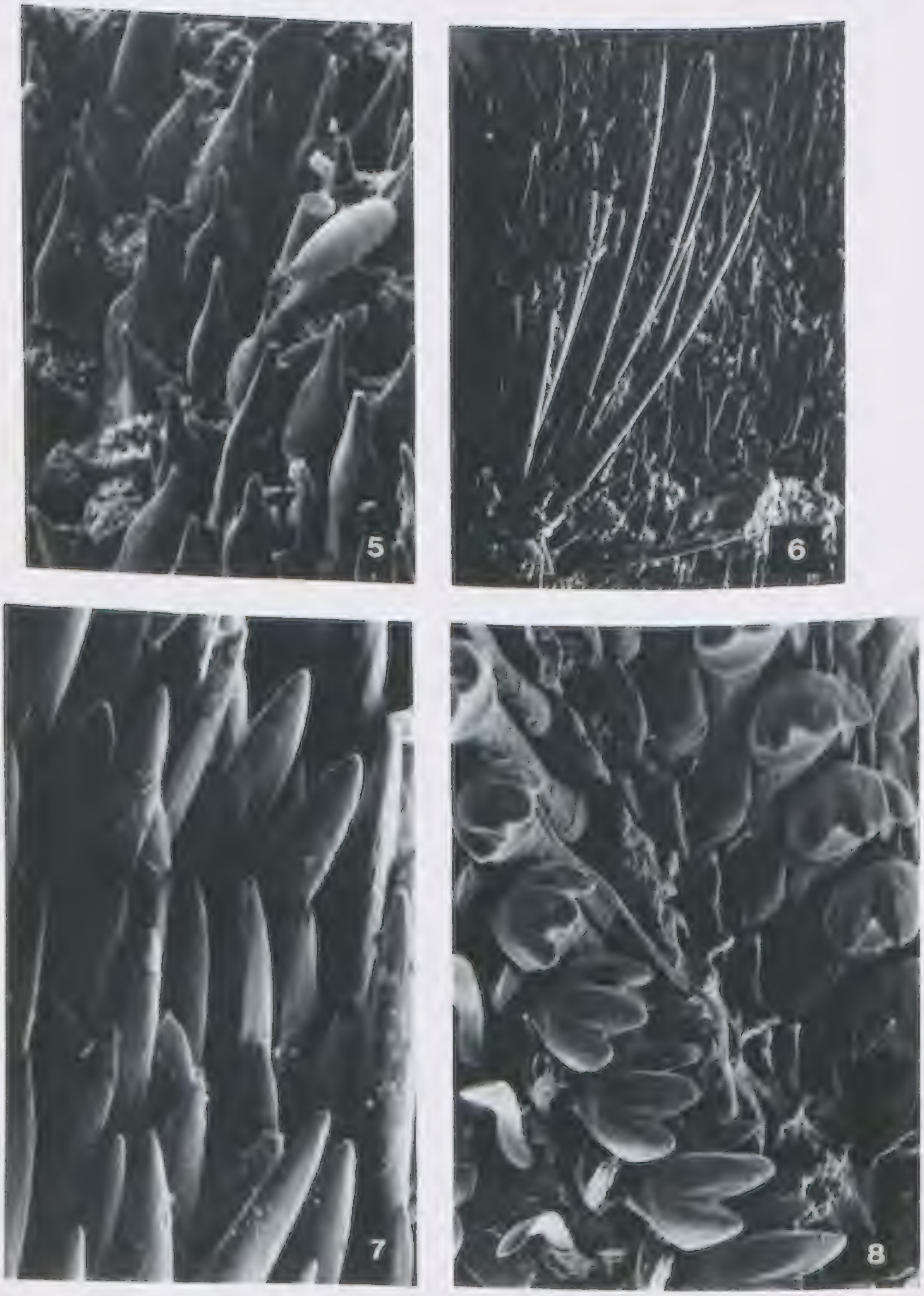

PLATE 20

Figs. 5–8. *Acanthochitona mastalleri*, paratype, Egypt, 6 km. north of Hurghada, colln. Strack no. 1277; (5) small dorsal spicules, 1021x; (6) sutural tuft and large dorsal spicules, 154x; (7) ventral scales, 1021x; (8) radula (cusps of major lateral teeth on upperside photograph worn), 206x.

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THE MOLLUSCAN FAUNA OF A FLANDRIAN TUFA AT LOWER BECK, MALHAM, NORTH YORKSHIRE

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(*Accepted for publication, 26th November, 1988*)

Abstract: Small patches of friable tufa associated with the cemented tufa apron of Lower Beck, Malham have yielded a land mollusc fauna indicative of woodland conditions totally unlike the treeless aspect of much of the northern Pennines today. By analogy with similar faunas in southern England and Lincolnshire, an age in the Middle Flandrian is suggested for the tufa accumulation. Among the species found is *Vitrea subrimata* (Reinhardt) otherwise unrecorded in the Flandrian in Britain.

INTRODUCTION

Calcareous tufa is widespread but local in distribution in the Malham district of North Yorkshire (Pentecost 1981). Most accumulations occur around springs feeding the Gordale Beck, and the west bank tributaries of the Skirfare and Wharfe. Although the extent of the tufa has been previously recorded, little attention has been accorded to the molluscan faunas contained in it. A general examination of the tufa sites mentioned by Pentecost (1981) provided one, Lower Beck (Fig. 1) (SD 914 699), with patches of friable tufa within the otherwise strongly cemented tufa apron, which allowed the separation of the shells of a molluscan fauna.

SITE AND STRATIGRAPHY

The site at Lower Beck lies some 150 m upstream of the junction of the Lower Beck with Cowside Beck. The tufa extends for around 50 m along the west side of the beck and forms a variable layer between 40 and 60 cm thick on the valley side and over a limestone scree which makes up the substrate at the site. The tufa is heavily vegetated, but dug sections showed undifferentiated cream or white tufa almost everywhere present immediately below the surface cover of soil and mossy humus. Much of the tufa is strongly cemented into a honeycomb structure, but throughout patches are less strongly lithified and samples were taken from these.

SAMPLING AND SAMPLE PREPARATION

In total five samples were taken from the tufa. Four stratified samples, each *circa* 15 cm thick, were taken from the full thickness of the friable tufa near the base of the slope in the centre of

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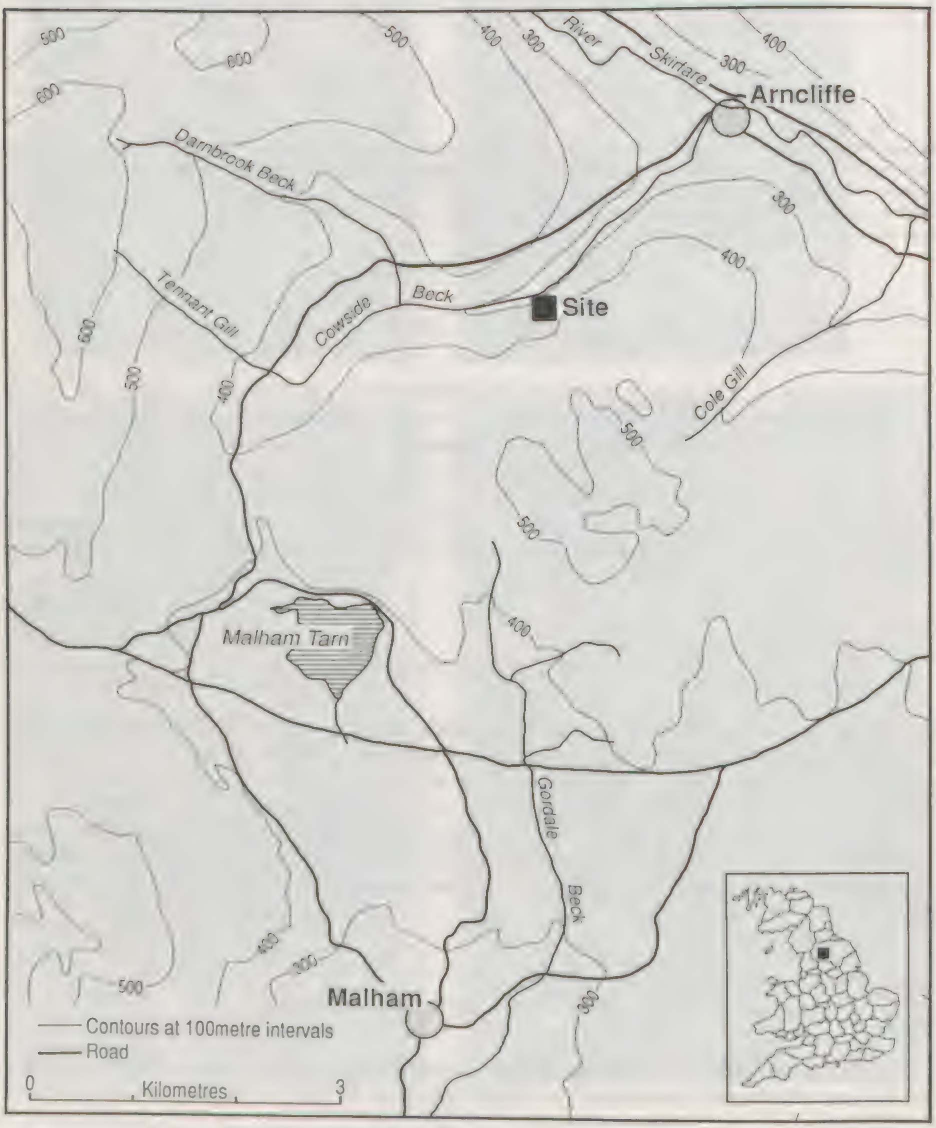

Fig. 1. A location map of the Malham area, North Yorkshire showing the position of the Lower Beck site.

the tufa apron [sample numbers LB1 (base) to LB4 (top)]. When oven dried, rewetted and washed through sieves down to 30 μm aperture, these samples had a final dry weight between 0·6 and 0·8 kg. A further sample, LBA, with a final processed dry weight of 3·0 kg, was taken from a conspicuously shelly patch of the topmost tufa near the top of the banked-up tufa mass.

MOLLUSCAN FAUNA

The fauna of the samples is shown in Table 1. In general the condition of the fossils was good, although corrosion had caused some damage to individual shells. The four stratified samples from the base of the tufa show a similar sequence which is dominated by swamp species such as *Lymnaea truncatula* (Müller) and *Zonitoides nitidus* (Müller). The bulk of the rest of the fauna is made up of snails of catholic habitat requirement represented principally by the genus *Vitrea*. Also strongly present however, are species of shade demanding taxa, the group characterized by Preece (1979) as terrestrial 'B', such as *Aegopinella nitidula* (Draparnaud), *Aegopinella pura* (Alder) and *Carychium tridentatum* (Risso). Although there are slight variations upwards through the four samples, the fauna is rather uniform in its composition. Broadly it is an assemblage of swamp and shade demanding taxa with no representatives of grassland habitats, e.g. *Pupilla muscorum* (Linné), *Vallonia* spp., being present.

The sample LBA as well as being much larger than the four stratified samples, also came from higher up the tufa mass and may be somewhat younger in age. Although the same three ecological groups are present the balance between them has changed. The swamp group has a much lower representation with only small numbers of *L. truncatula*, and with *Z. nitidus* restricted to a single individual. The catholic group, the terrestrial 'A' of Preece (1979), are still strongly represented, but considerable growth has taken place in numbers of terrestrial 'B' species with numerous *Aegopinella spp*., and *C. tridentatum*. Other shade demanding taxa with high values in LBA, are *Leiostyla anglica* (Wood) and *Spermodea lamellata* (Jeffreys), while a further member of this association, *Oxychilus cellarius* (Müller), makes its first significant appearance in this sample. A noteworthy species well represented in LBA is *Azeca goodalli* (Férussac) which may indicate the occurrence of the leaf-litter and mossy habitats favoured by this species.

In summary, the environment represented by the fauna from LBA is similar to that of LB1–4, but with a decrease in the amount of wet habitats and an increase in the deep shade of well-developed deciduous woodland. As in the stratified samples there is no evidence of any degree of open habitats. This is in marked contrast to the faunas of recently forming tufa along the margins of Gordale Beck at Great Close and Gordale some 5 km to the south. Here, although a few specimens of *L. anglica* and *S. lamellata* do occur, they are accompanied by such open ground species as *Vallonia costata* (Müller) which are totally absent from the Lower Beck assemblage. The same pattern is revealed in the survey of the modern molluscan fauna of the Malham area by Cameron (1978). In this work, the deep shade elements noted above such as *L. anglica* and *S. lamellata*, are completely unrecorded, although Cameron notes that other shade-demanding species such as *Oxychilus* spp. and *Aegopinella* spp., are present, often in damp, rocky area, where moss and deep shade between rocks provides a micro habitat similar to that of old, stable woodland.

It is clear from this fauna that the site of deposition was, during the development of the tufa, an area of closed or at least dense, woodland. This is in marked contrast with the present aspect of this part of the Pennines which is virtually treeless, but supports the palynological data from Malham Tarn, *circa* 3 km south west of Lower Beck, where Pigott

TABLE 1: LAND MOLLUSCA OF THE LOWER BECK TUFA

	LB1 *(base)*	*LB2*	*LB3*	*LB4*	*LBA* *(top)*
Carychium minimum Müller	2	14	9	12	56
Carychium tridentatum (Risso)	6	13	15	14	317
Carychium sp.	17	19	48	15	208
Lymnaea truncatula (Müller)	26	68	28	105	13
Azeca goodalli (Férussac)	2	3	4	4	324
Cochlicopa lubrica (Müller)	2	1	1	—	8
Cochlicopa sp.	—	—	1	2	—
Columella aspera Waldén	—	—	—	—	16
Columella sp.	1	3	—	2	—
Vertigo cf. pusilla Müller	—	1	—	—	—
Vertigo substriata (Jeffreys)	2	4	3	1	29
Vertigo sp.	5	7	5	5	13
Leiostyla anglica (Wood)	10	5	12	23	88
Acanthinula aculeata (Müller)	1	2	—	—	6
Spermodea lamellata (Jeffreys)	1	—	—	4	29
Punctum pygmaeum (Draparnaud)	2	6	6	10	23
Discus rotundatus (Müller)	5	22	7	4	116
Arion sp.	+	+	+	+	+
Vitrina pellucida (Müller)	—	1	1	1	2
Vitrea subrimata (Reinhardt)	2	5	14	6	152
Vitrea crystallina (Müller)	9	24	17	10	241
Vitrea contracta (Westerlund)	1	19	14	11	70
Vitrea sp.	13	27	48	27	55
Nesovitrea hammonis (Ström)	3	5	1	2	16
Aegopinella nitidula (Draparnaud)	12	5	33	7	101
Aegopinella pura (Alder)	18	30	55	16	194
Oxychilus cellarius (Müller)	—	1	—	—	51
Zonitoides nitidus (Müller)	4	45	48	29	1
Milax sp.	25	16	32	7	7
Limax sp.	11	9	8	5	24
Euconulus fulvus (Müller)	3	2	5	—	48
Clausilia bidentata (Ström)	—	—	2	1	3
Clausilia sp.	2	2	4	6	—
Trichia hispida (Linné)	9	6	4	2	18
Cepaea/Arianta sp.	1	3	9	2	9
Total	196	368	432	330	2176

and Pigott (1959) record closed forest existing well into Middle Flandrian times. Other tufas in the Malham area also show palaeobotanical evidence of the wooded nature of the area during their formation. Pentecost (1985) describes a tufa at Mealy Bank south of Settle containing the impressions of the leaves of *Alnus* sp. This is also indicative of a greater woodland cover during the time of tufa development as this area too is virtually without tree cover at present.

Within the fauna one particular snail species deserves further mention. *Vitrea subrimata* (Reinhardt) is present in all samples. Currently this species occurs only in the northern Pennines in Britain with its next nearest stations being in the Harz Mountains and Thuringian Forest in Germany, and in the Jura and Pyrenees in France (Kerney and Fogan 1969, Kerney and Cameron 1979). *V. subrimata* has no previous fossil record in the British Flandrian, although there is a single record of it from the Ipswichian Interglacial deposits of Tattershall, Lincolnshire (Holyoak & Preece 1985).

The record from Lower Beck does not assist in explaining the European range of *V. subrimata*, but it shows at least that the species has been in the area where it is currently well established since Middle Flandrian times.

OTHER FOSSILS

Ostracods were common in samples LB1–4 in keeping with the generally wet character indicated for the Lower Beck deposits by the Mollusca. Dr. J. E. Robinson (University College, London) examined the specimens and supplied a brief analysis of the fauna. Only one species occurred, *Psychrodromus olivaceus* (Brady and Norman) and this was only represented by adult valves. In total 32 valves were collected with Sample LB1 yielding one valve, LB2 14 valves, LB3 2 valves and LB4 15 valves. *P. olivaceus* is a typical species of tufa and limestone springs, both at present and in the Middle Flandrian, being recorded from Kent (Kerney, Preece and Turner 1980), Lincolnshire (Preece and Robinson 1984), the Pennines (Holdgate 1955) and central Ireland (Preece and Robinson 1982). In these localities its habitat ranges from calcareous springs and pools on the surface of tufa aprons, to small spring-fed lake basins.

Also present in LB1–4 and in LBA were the calcareous cemented larval cases of the Leptoceridae family of Trichoptera. These small, curved larval cases appear to be a common fossil in tufas, as noted by Preece (1979).

AGE OF THE LOWER BECK DEPOSITS

The complete absence of plant tissue in the deposits precluded any attempt at a radiocarbon date for the Lower Beck tufa. An accurate date therefore is not possible. However an approximate age range for the site can be obtained by comparison with similar faunas from other sites elsewhere. The key factor in such dating is that the Lower Beck fauna is exclusively a woodland one and therefore pre-dates the early agricultural clearances of the Flandrian forest. In southern England Kerney (1977) and Kerney, Preece and Turner (1980) have established a series of radiocarbon calibrated biozones using the land mollusc fauna which can be used to indicate their approximate ages. This scheme has also been used successfully in the Cotswolds and Mendips by Willing (1985), in Sussex by Ellis (1985), in Dorset by Preece (1980), and in Lincolnshire, although with some reservations, by Preece and Robinson (1984). The scheme does not seem to be usable in the case of one of the few other upland tufas which have been described, that of Inchrory, Banffshire (Preece, Bennett & Robinson 1984), because of the absence at this locality of several of the crucial species which delimit the boundaries of Kerney's biozones.

At Lower Beck the occurrence of *Discus rotundatus* (Müller), *S. lamellata* and *L. anglica* together with increasing numbers of *O. cellarius* near the top of the tufa suggest correlation with an age in zone d of Kerney *et al.* (1980). By comparison with Preece and Robinson's sites (1984) in the Ancholme Valley, Lincolnshire, the same early expansion of *S. lamellata* and *L. anglica*, predating that of *O. cellarius* preclude the subdivision of zone d into two subzones, d_1 and d_2 in the way that this was done in Kent by Kerney, Preece and Turner (1980). Thus the age range represented by the Lower Beck tufa lies within the limits 8,000–5,000 years before the present if this zonation scheme can be applied in North Yorkshire, although an age towards the younger end of that time range seems most probable given the frequency of *O. cellarius* at the top of the Lower Beck deposit.

That tufa was being formed in the Malham area during this time span is indicated by the radiocarbon date of 8000 ± 600 bp obtained from the Settle tufa by Pentecost (1985), but the absence of molluscan records from this deposit makes application of this date to the Lower Beck deposits difficult.

In the absence of suitable material for radiocarbon dates at the lower Beck site, no closer age estimate can be obtained for these deposits.

CONCLUSIONS

The Lower Beck tufa was deposited under woodland conditions during the time 8,000–5,000 years before present. The site supplements palynological data from Malham Tarn and plant macro-fossil evidence from Settle which are indicative of such conditions in the Middle Flandrian. The application of Kerney, Preece and Turner's scheme of molluscan biozones to the Pennines seems possible, although both older and younger deposits would be necessary to confirm the full zonal sequence. The geographical range of *V. subrimata* with its outlying population in northern Britain dates from at least the Middle Flandrian.

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J. Conch. 33: 179–182 (1989)

ADDITIONS TO THE MOLLUSCAN FAUNA OF THE EARLY MIDDLE PLEISTOCENE DEPOSITS AT SUGWORTH, NEAR OXFORD, INCLUDING THE FIRST BRITISH QUATERNARY RECORD OF *PERFORATELLA BIDENTATA* (GMELIN)

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(*Accepted for publication, 26th November, 1988*)

Abstract: Shells recovered from large bulk samples of the interglacial sediments from Sugworth, originally processed for vertebrate remains by Dr. A. J. Stuart, have provided several additional records. These include *Discus ruderatus*, *Cochlicopa lubricella*, *Gyraulus acronicus*, *Clausilia bidentata* and have confirmed records of *Clausilia pumila*. The most noteworthy record however, is *Perforatella bidentata*, a woodland snail with an east European modern range, hitherto unknown from the British Quaternary. Several elements of the molluscan fauna suggest a certain degree of climatic continentality. An early Middle Pleistocene interglacial age, pre-dating the Anglian, is reaffirmed on the basis of molluscan and vertebrate evidence. Independent support is also provided by amino acid ratios derived from the shells of *Valvata*. A recent suggestion that the deposits should be assigned to the late Hoxnian, on the basis of altimetric arguments, is rejected.

During 1972–3, excavations for the A34 Abingdon by-pass at Sugworth Lane (SP (42) 513007), south of Oxford, revealed a series of organic deposits filling channels cut into Kimmeridge Clay bedrock. These organic deposits have been investigated in detail by Shotton *et al.*, (1980) with individual contributions on the fossil vertebrates (Stuart 1980), ostracods (Robinson 1980), insects (Osborne 1980), and molluscs (Gilbertson 1980). The palaeobotany had been described in an earlier paper (Gibbard & Pettit 1978). There was unanimous agreement that the deposits belonged to the late temperate substage of an early Middle Pleistocene interglacial, and a general consensus that the interglacial was the Cromerian. The deposits now occur beneath concrete in the sides of a cutting where a bridge crosses the road.

In the previous study (Gilbertson 1980) a series of samples, each between 1·5 and 2·0 kg, was analysed from successive stratigraphic levels through the organic deposit. The shells recovered by Dr. A. J. Stuart from much larger bulk samples (each ~ 20 kg) taken specifically for vertebrate analysis (Stuart 1980) are lodged, together with the vertebrate material itself, in the University Museum of Zoology, Cambridge. A recent study of these shells has revealed several species that were not recovered by Gilbertson and has enabled others, previously listed only tentatively, to be recorded with complete confidence.

The most noteworthy addition is *Perforatella bidentata* (Gmelin), a distinctive woodland snail, today found in eastern Europe with scattered localities in south-east and central Germany, eastern Denmark, southernmost Sweden, southern Finland and eastern France (Kerney & Cameron 1979). The record is based on a single adult shell (Fig. 1) from sample D16 (see Shotton *et al.*, 1980, fig. 4 and Stuart, 1980 for provenance of samples). It has hitherto never been found as far west as Britain either living or fossil. However, it is known fossil, beyond its present range, in The Netherlands where it has been found in deposits

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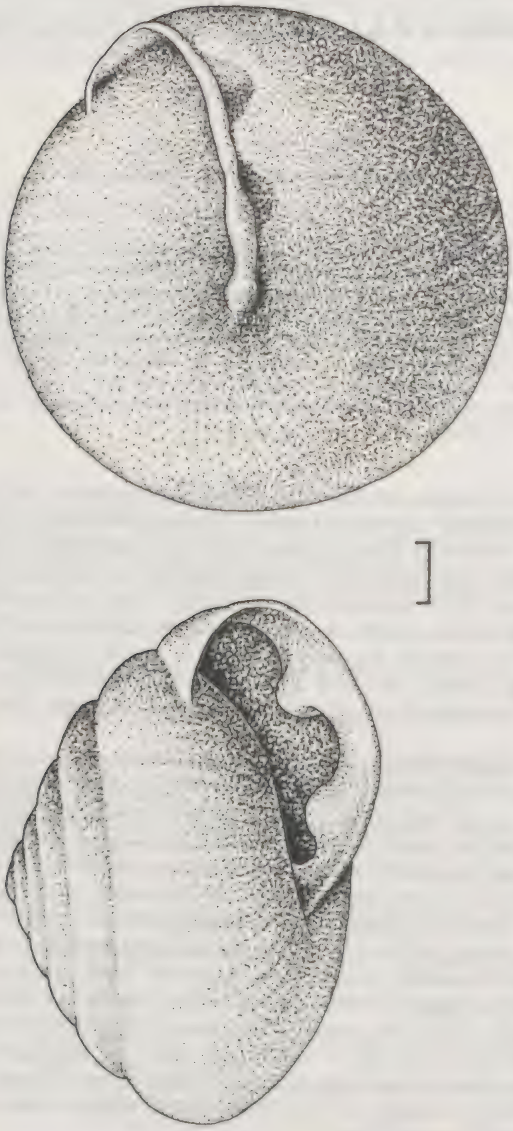

Fig. 1. *Perforatella bidentata* (Gmelin); fossil shell from sample D16, Sugworth. Scale bar = 1 mm.

belonging to both the Early and Late Pleistocene. Meijer (1986) has commented that the shells from the Early Pleistocene (Tiglian–Bavelian) belong to a large form (up to 12 mm) whereas those from the Late Pleistocene (Eemian) are much smaller (up to 9·5 mm) and match modern shells whose breadths are given as 6·5–8·5 mm (Kerney & Cameron 1979). The small form is also known from the early Middle Pleistocene of Mosbach, FRG (T. Meijer collection). Having examined this continental material, it is clear that the Sugworth shell (height 5·9 mm, breadth 8·3 mm) also belongs to this small form.

Other noteworthy additions include *Discus ruderatus*, which has a boreo-alpine modern range in Europe. Several shells were present in samples 8, B18, D16, D17 but curiously no trace of *Discus rotundatus*, listed by Gilbertson (1980) could be detected. A distinctive large, depressed form of *Trichia* (height 5 mm, breadth 10 mm) with a wide umbilicus representing nearly a fifth of the diameter of the shell was also present in several samples (B18, C11, C13, D16, D17). The identification of *Trichia* shells is notoriously difficult but the Sugworth shells fall outside the range of *T. hispida* that I have encountered in the British Isles. *Clausilia pumila*, which was listed only tentatively by Gilbertson, can now be recorded with complete confidence as diagnostic apertural fragments were present in samples D17 and C13. A complete shell of *Clausilia bidentata* was also present in C11. Additional terrestrial taxa include *Cochlicopa lubricella* (single shell in D17) and an indeterminate helicelline, with traces of banding preserved, in D16. These additional records, particularly the *P. bidentata*, *D. ruderatus* and *C. pumila*, reinforce Gilbertson's conclusion that the contemporary climate must have been quite continental.

Amongst the aquatic taxa, it is clear that at least some of the *Gyraulus* are *G. acronicus*. It is very difficult to separate this species from *G. albus* as the distinctive angulation of the periphery of *G. acronicus* is only developed in larger shells. Adult shells undoubtedly belonging to this species were present in A13, C13 and C11. In Britain today *G. acronicus* is confined to the Thames and its tributaries. The Sugworth shells constitute the earliest British Quatenary record and demonstrate that the association with the Thames drainage system has a long history.

Another interesting feature was the fact that two distinct forms of *Sphaerium corneum* occurred together in several samples. The extremely thickened form with protuberant umbones, that Kennard (1911) called *S. bulleni*, occurs in approximately equal proportions with the ordinary thin-shelled form. These were probably derived from different micro-habitats. An identical situation is known from the Cromerian stratotype at West Runton, Norfolk (Sparks in West 1980).

The consensus view, based on biostratigraphy, that the deposit is Cromerian has recently been questioned by Gibbard (1985). He pointed out that the elevation of the site (85·5–92 m OD) is anomalously low for an apparently undisturbed deposit as old as the Cromerian. Instead he favoured a younger, late Hoxnian (Ho IIIb) age. Although the palynology may allow such a reinterpretation, it is completely at odds with both the molluscan and vertebrate evidence. Both these groups include extinct taxa which are unknown anywhere after the Anglian (=Elsterian) cold stage. These include the freshwater prosobranchs *Tanousia runtoniana* (=*Nematurella runtoniana* auctt.), and *Valvata goldfussiana*, the voles *Mimomys savini* and *Pliomys episcopalis*, the shrew *Sorex savini* and the rhinoceros *Dicerorhinus etruscus*. The fauna from Sugworth is similar to that from the Cromerian type site at West Runton and is consistent with direct correlation. However, there is a large hiatus in the British Quaternary sequence between the Cromerian/Beestonian and the Pastonian, which is now thought to equate with the Late Tiglian. In the Netherlands a series of glacial-interglacial cycles are known to have occurred in this interval. Since several of these critical taxa are also known from interglacial episodes that fall within this time period, it is also possible that the deposits at Sugworth might equate with an earlier temperate stage in the early Middle Pleistocene. They certainly cannot, however, post-date the Cromerian.

Independent support is provided by aminostratigraphy. D alloisoleucine/L isoleucine ratios have been obtained from shells of *Valvata piscinalis* from Sugworth. These ratios (mean 0·286±0·016, n=2) are very similar to ratios obtained from the same species from West Runton (mean 0·283±0·037, n=5) implying that they are of similar age. They are also higher than comparable ratios from various Hoxnian sites, including Hoxne itself (mean 0·243±0·023, n=3). Further work may clarify the precise position of Sugworth within the early Middle Pleistocene and establish whether it is a direct correlative of West Runton.

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J. Conch. **33:** 183–184 (1989)

REVIEWS

A Revision of the Fossil and Living Gastropods Related to Plesiotriton *Fischer, 1884 (Family Cancellariidae, Subfamily Plesiotritoninae n. subfam.), with an Appendix: Genera of Buccinidae Pisaniinae Related to* Colubraria *Schumacher, 1817.* A. G. Beu and P. A. Maxwell. New Zealand Geological Survey Palaeontological Bulletin 54, 1987.

This thorough review deals on a global basis with 7 genera of smallish neogastropods – *Turehua* Marwick, 1943; *Varicohilda* Eames, 1957; *Kapuatriton* n.gen.: *Plesiotriton* Fischer, 1884; *Africotriton* n.gen.; *Tritonoharpa* Dall, 1908, and *Loxotaphrus* Harris, 1897. These range in age from the Late Cretaceous to the present day and, for the most part, were placed in the past in the Ranellidae. The authors assign them to the Cancellariidae and erect for them the new subfamily Plesiotritoninae, for which the principal taxonomic criterion is axial costae which are opisthocline and not collabral, a feature shown by no other Cancellariidae. Placement in the Cancellariidae is based on the similarity of the protoconch to that of other members of the family, the presence of columellar plaits in five of the genera, and the possession by *Plesiotriton vivus* Habe and Okutani, 1981 and *Africotriton crebriliratus* (G. B. Sowerby III, 1903) of a radula consisting of a single row of long, narrow, rachidian teeth. The radula, or lack of it, has apparently only been described for some 25 species of Cancellariidae, but a radula of this type appears to typify those cancellariids which have one. Though three of the genera of Plesiotritoninae are extinct and one, *Tritonoharpa*, lacks both radula and columellar plaits, it would be difficult not to accept the findings of the authors on the detailed evidence presented by them. My only point of curiosity is whether there really is no close connection between the Eocene *Varicohilda turriculata* (Newton, 1922) and the Recent *Loxotaphrus deshayesii* (Duval, 1841) both from West Africa.

The Bulletin includes a review of *Semitriton* Cossmann, 1903 and *Tatara* Fleming, 1950 and comments on *Caveola* Stephenson, 1941 and *Fusiaphera* Habe 1961. These four genera are assigned to the Cancellariinae. The authors also remove a number of genera and species from the Ranellidae and Cancellariidae.

Finally, as the title indicates, an appendix lists and comments on the genera of Buccinidae, Pisaniinae, related to *Colubraria* – *Fusus* Helbling, 1779; *Iredalula* Finlay, 1926; *Kanamarua* Kuroda, 1951 and *Metula* H. and A. Adams, 1853. The effect of this appendix is to propose that *Colubrariidae* Dall, 1904 be no longer recognized as a separate family.

This works is very well produced and I was only able to spot one very minor typographical error. The illustrations are excellent and generally follow the order of the text but the only way back to the text from the plates is via the index, which could increase the wear on the publication.

The summary of the classification adopted on page 58 lists the new taxa and combinations proposed, including 19 new species.

It is thoroughly recommended, especially for all institutional libraries and professional malacologists dealing with marine mollusca and for anyone interested in the Cancellariidae, and is obtainable from the New Zealand Geological Survey, P.O. Box 30–368, Lower Hutt, New Zealand.

D. C. Long

Late Miocene Deep-Water Mollusca from the Stillwater Mudstone at Greymouth, Westland, New Zealand: Paleoecology and Systematics. P. A. Maxwell. New Zealand Geological Survey Palaeontological Bulletin 55, 1988.

This Bulletin is concerned with the molluscan faunules found at two localities about a kilometre apart on the north-west coast of South Island, New Zealand. It is of interest firstly because there have been relatively few studies of Neogene deep-water mollusc faunas and, secondly, for the taxonomic conclusions given, or foreshadowed, in it.

A comparison with selected Miocene molluscan faunules in New Zealand is followed by a balanced discussion of the evidence from the Mollusca that the Stillwater mudstone was laid down in the upper bathyal zone at a depth of probably 400–800 m. A bathymetric analysis (by genus) precedes a Taxonomic Structure Analysis which produced a result not closely corresponding to that for any present day depth zone. Reasons for the anomalies are considered with the sensible conclusions that factors other than water depth can have a significant effect on the taxonomic structure of a molluscan faunule and that Taxonomic Structure Analysis requires refinement before it can be used for paleobathymetric interpretations. The paleoecological section of the Bulletin ends with a trophic analysis of the two faunules which is thorough and decides that their preserved component is dominated by presumed deposit feeders and carnivores. There was an abundance of worm-eating molluscs, and molluscs were in turn preyed upon by other molluscs, decapod crustaceans and teleost fish.

The bivalve fauna was dominated by protobranchs and the systematic consideration of these includes a revised classification of New Zealand species assigned to *Jupiteria* Bellardi, 1875. The presence of *Parvamussium* n.sp. caused the author to review the classification of New Zealand internally costate pectens.

In dealing with the gastropods, I was glad to see the author merging the New Zealand *Zexilia* Finlay, 1927 with the North American and European *Exilia* Conrad, 1860 and giving notice of intent to publish reasons for locating the genus in the Turbinellidae. On the Turridae he proposes that the subfamily Cochlespirinae Powell, 1942 (= Turriculinae Powell, 1942, sensu Powell, 1966 but excluding Pseudotominae Bellardi, 1875) he synonymized with the Turrinae Swainson, 1840 because the position of the anal sinus in relation to the shell periphery cannot be sustained as a suprageneric taxonomic criterion. *Mauidrillia* Powell, 1942, to which a number of late Eocene to Pliocene New Zealand and Australian fossils have been assigned, is relocated in the subfamily Borsoniinae, with the suggestion that it may by a synonym of *Typhlomangelia* Sars, 1878; (I suggest this could be followed up by comparing the species assigned to both genera with various species allocated to *Asthenotoma* Harris and Burrows, 1891). A similar transfer is made for *Tomopleura*, Casey, 1904. I am not sure why, in a summary of the classification of species previously assigned to *Mioawateria* Vella, 1954, *Antiguraleus* Powell, 1942 has been placed in the Raphitominae.

New taxa, new synonymies and new combinations proposed are conveniently listed on page 77. The photographs excellently illustrate the Stillwater Mudstone molluscan fauna. Typographical errors are very few indeed.

The Bulletin is thoroughly recommended for all interested in the molluscan groups where the author has made taxonomic revisions and innovations, in the ecology and paleoecology of deep-water molluscs and in the marine mollusca, living and fossil, of Australia and New Zealand. It is obtainable from the New Zealand Geological Survey, PO Box 30368, Lower Hutt, New Zealand.

NOTICE OF PUBLICATION

A Classification of the Living Mollusca assembled by Kay Cunningham Vaught. xii + 189 pp., 1989. edited by R. Tucker Abbott and Kenneth J. Boss, plastic comb binding, $17.00; hardback, library binding, $21.00. (plus $2.00 mailing) American Malacologists, P.O. Box 1192, Burlington, MA 01803.

Now, after several years of careful searching the reams of molluscan literature, Kay Vaught has presented us with a 'state of the art' compilation of supraspecific names in the Mollusca. The author has done the best job possible by providing a systematic listing of family and generic names, with the details of classification corroborated by the top specialists in particular groups of mollusks. This enormous task has resulted in a volume of nearly 200 pages, taking into account over 15,000 named higher taxa, of which approximately 10,000 are considered to be valid and usable (the remainder are now considered synonyms).

In addition to introductory explanations, the volume includes acknowledgements, systematic arrangement, the classification of the entire phylum, and an index to all names included. With a work of such scope, it is important to remember three points: first, read the explanations to be able to use this book to best advantage; second, there are bound to be minor errors in an effort of such magnitude; third, there will also be omissions and new names to be entered, so please contact the compiler with any data that you might have to offer. There will also be differences of opinion on the systematic placement of some names.

The compiler, those who have assisted her in any way, and the editors deserve the appreciation of both malacologists and amateur collectors for this carefully prepared work that will soon become indispensable to us all. Many smaller universities, museums and other involved with malacological collections and their proper curation will find this book their first and foremost source of information on the supraspecific taxa of the phylum Mollusca. This work shows just what a dedicated student of malacology can accomplish given the proper guidance and assistance. And, last of all, this book is priced so reasonably that all who need it can buy and make use of it immediately.

WALTER SAGE

J. Conch. **33**: 185–187 (1989)

COMMUNICATIONS

INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

The following Opinion was published on 23 September 1988 in Vol. 45, Part 3 of the *Bulletin of Zoological Nomenclature*.

Opinion 1502 *Conus fergusoni* G. B. Sowerby III, 1873 (Mollusca, Gastropoda): specific name conserved.

ICZN, c/o British Museum (Natural History) Cromwell Road, London SW7 5BD

A LATE PLEISTOCENE SCAPHOPOD FROM JAMAICA

The benthic mollusc faunas of the raised Pleistocene reefs on Jamaica's north coast are large and diverse, but hitherto largely ignored by systematists. We are currently examining the mollusc fauna of two particularly rich localities in the youngest of these deposits, the Falmouth Formation (=Reef Terrace 1, 130,000 years old: Cant, *J. geol. Soc. Jamaica* **12** (1972) pp. 13–17). One of these localities, exposed in a facies dominated by the coral *Porites* spp., on the eastern shore of Rio Bueno Harbour, Parish of St. Ann (site 7 in Liddell *et al.*, *Modern and ancient carbonate environments of Jamaica Sedimentia* **10** (1984) vii+98 pp., University of Miami), has yielded the first fossil scaphopod to be recognized from the Pleistocene of Jamaica. The only other fossil scaphopods from the island were reported from the Pliocene Bowden Beds (Robinson, *J. geol. Soc. Jamaica* **9** (1967) pp. 32–41) by Woodring (*Publs Carnegie Inst. Wash.* **366** (1925) 222 pp.).

The unique Pleistocene specimen is identified as *Dentalium* sp. cf. *D. antillarum* Orbigny (Henderson, *Bull. U. S. natn. Mus.* (1920) **111**, pl. 5, figs 1 and 3 particularly). This specimen is 13 mm in length. The diameter of the anterior aperture is 2·0 mm (overall diameter 2·5 mm) and of the posterior aperture 1·1 mm (overall diameter 1·7 mm). The radius of curvature of the shell is approxiately 80 mm. The shell section is circular, with a simple apex. The external surface is sculptured by fine, anterio-posteriorly orientated ribs which are alternately broader (primary) and narrower. Extremely fine, closely spaced growth lines are apparent. The majority of molluscs in this deposit preserve some original colour. However, the scaphopod shell does not and is opaque white in colour. The shell has been bored on the left lateral surface, about 3 mm below the apex, by a predatory gastropod. This boring is chamfered and was probably produced by *Polinices lacteus* (Guilding), the commonest predatory species at this locality.

This specimen appears to have a slightly different pattern of ribbing from *D. antillarum sensu stricto*. The Rio Bueno specimen has 10 primary and 10 secondary ribs at the apex, all continuing along the length of the shell. At the mid point these are irregularly divided by 9 tertiary ribs, which increase in number to 20 by the anterior aperture. This is comparable, but not absolutely identical, to the pattern of ribbing described by Henderson.

This specimen is to be deposited in the Department of Palaeontology of the British Museum (Natural History). This is Discovery Bay Marine Laboratory, University of the West Indies, contribution number 444.

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(*Received, 30th May, 1988*)

ONCE MORE ON THE RANGE OF *VALLONIA ENNIENSIS*

Following an interesting note concerning French localities for shells of *Vallonia enniensis* (Gredler, 1856) in *J. Conch. Lond.* **33** (1988) (p. 50) by Chatfield & Stevanovitch, some additional data concerning the distribution of this species can be given. (The Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands, is abbreviated RMNH).

Kerney and Cameron (1979), in their well-known Field Guide do not indicate that *V. enniensis* is found alive in eastern Europe, but report the species from (p. 96) 'a few spots in S. and E. Germany, S. Sweden, Switzerland (Geneva basin)'.

In addition to Gasull's account of specimens from the province of Valencia, there are at least two more records of *V. enniensis* from Iberian Spain. Haas (*Trab. Mus. Cienc. nat. Barcelona* **13** (1929) p. 319) reported the species from the provinces Tarragona and Lerida. Altimira (*Public. Inst. Biol. aplic. Barcelona* **46** (1969) p. 98) mentioned it from the delta of the Llobregat in the province of Barcelona.

In RMNH there is an opaque shell from the province of Lerida, along the Embalse de Camarasa, 15 km N of Balaguer (UTM: CG24), collected by Visser and Zoer. In the former Altimira collection (in RMNH) there are three samples with very fresh specimens, partly with dry remains of the soft parts inside, all from localities near the coast: Barcelona, Ermita Santa Maria Cervello at Cervello, 20 km W of Barcelona city (UTM: DF18); Tarragona, La Cava (UTM: CF00); Valencia, Jaraco (UTM: YJ42). Thus *V. enniensis* belongs with certainty to the recent molluscan fauna of Spain.

V. enniensis is also living on the island of Mallorca. It has been reported from three localities there by Gasull (*Bol. Soc. Hist. nat. Baleares* **23** (? 1979) p. 14). Shells in RMNH, collected by Int. H. W. Waldén, contain dry remains of the soft parts of the animals.

April 27th 1947 the late Dr. C. O. van Regteren Altena collected four live specimens of *V. enniensis* on the Canary island La Palma, at c. 350 m altitude near Los Llanos de Aridane. Ecological data are unknown. Altena did not recognize the species, poorly known those days, and kept it apart as problematic in RMNH, where it remained unnoticed until recently.

During field work in Greece, opaque and a few fresh translucent shells of *V. enniensis* were encountered at the following localities (material in RMNH): Fthiotis, marshy area with springs, 4 km W of Ayios Konstantinos at Kamena Vourla (UTM: FH59); Kerkyra island, along brooklet at Ermones (UTM: CJ9585); Lakonia, along brooklet 5 km SW of Yithion (UTM: FF36). Schütt collected the species in Makedhonia (material in colln Schütt), along the river at Kavalla (UTM: KF93).

I am most grateful to Dr. H. Schütt, G. J. M. Visser, Int. H. W. Waldén and J. A. Zoer for giving me the opportunity to benefit by their malacological field work.

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(*Received, 15th July, 1988*)

WESTWARD EXTENSION OF THE DISTRIBUTION OF *THEBA PISANA* IN SOUTH WALES

The distribution of *Theba pisana* (Müller) in England and Wales is well documented (Cowie, *Ph.D. Thesis* (1982) Liverpool University; *Nature in Wales, New Series* **4** (1987) pp. 66–70; *J. Conch., Lond.* **32** (1987) pp. 384–385; Humphreys, *J. Conch., Lond.* **29** (1976) pp. 93–106; Humphreys *et al. J. Conch., Lond.* **31** (1982) p. 73; Turk, *J. Conch., Lond.* **26** (1966) pp. 19–25) and has remained more or less stable, or perhaps decreased and fragmented slightly since the nineteenth century (Stubbs, *J. Conch., Lond.* **9** (1900) pp. 321–328, 358–365). The largest colony is at Tenby in South Wales with other smaller colonies at Saundersfoot, east of Tenby, and at Manorbier and Stackpole Warren, west of Tenby. The other main colonies are at Porthcawl in Glamorgan and at St Ives and Treyarnon Bay near Padstow in Cornwall. Recently (27 May and 17 July 1988) we have discovered a new colony which extends the distribution of *T. pisana* significantly beyond that previously recorded.

The newly-discovered colony is in South Pembrokeshire (Dyfed, South Wales) at Freshwater West on the southern edge of the Broomhill Burrows Site of Special Scientific Interest (SSSI) and about 25 km. west of Tenby (site defined by National Grid References SR 885995, 886995, 885999, 886999). *Theba pisana* was found in vegetation along the roadside for about 400 m. and in the adjacent dunes close to the road. Its distribution was patchy but in places, especially associated with Alexanders (*Smyrnium olusatrum* L.) near the 'sluice', it was very abundant. In July most individuals were adult or near-adult and many were laying eggs during the day (which was damp and overcast). Other species of snail also recorded within the area were *Ashfordia granulata* (Alder), *Cepaea hortensis* (Müller), *C. nemoralis* (L.), *Cernuella virgata* (Da Costa), *Cochlicella acuta* (Müller), *Helicella itala* (L.), *Helix aspersa* Müller, and *Trichia striolata* (Pfeiffer).

The shell pattern variation of *T. pisana* in Britain is well known. All the snails seen at the new site had five-banded shells; most were dark five-banded, some were yellow five-banded and there were some intermediates; there were no unbandeds. (For details of these forms see Cowie, *Malacologia* **25** (1984) pp. 361–380). However, three unusual snails were seen. These possessed five-banded shells but pigment was absent (or almost absent) from the bands and the background shell colour was paler (almost white) than that of other Dyfed shells. These shells resembled the 'subhyalozonate' form described by Cain (*Malacologia* **25** (1984) pp. 381–411) from St. Ives. In all other respects the shells of this population resembled those of all other Dyfed populations, except that at Tenby itself which has unbandeds as well. The shells of the Dyfed populations as a whole are distinct from shells of all other British and European populations. This suggests that the new population, and probably all the other Dyfed populations, are derived from that at Tenby. However, the presence of the 'subhyalozonate' shells casts some slight doubt on this as far as the new population is concerned since RHC has never seen such shells in any Dyfed population. They could be the result of mutuation but one might then expect to have encountered similar mutuations in other small and localized Dyfed populations. Their presence here is unexplained but it will be interesting to see whether they are maintained in the population in the future.

T. pisana was probably introduced to Britain by Man, perhaps as recently as the eighteenth century (Cowie, *Ph.D. Thesis* (1982), Liverpool University; Turk, *J. Conch., Lond.* **26** (1966) pp. 19–25). It is essentially a Mediterranean species at its northern limit in south-west Britain and on the east coast of Ireland. It is possible that it has colonized virtually all suitable localities in Britain and Ireland. But it is also possible that many suitable localities have not been reached and that the present extension of its distribution is part of a slow process of continuing colonization.

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AMMONICERA ROTA AND *OMALOGYRA ATOMUS* FROM THE ISLE OF WIGHT

The Omalogyridae (Prosobranchia: Rissoacea) is represented in British Waters by *Ammonicera rota* (Forbes & Hanley) and *Omalogyra atomus* (Philippi). The shells of both species are biconcave, planorbiform and extremely small, with a maximum diameter of 1·0 mm.

Recent records for these two species are sparse, indeed *A. rota* appears to be a national rarity. *A. rota* has a very limited and scattered distribution of live records in the Atlas (Seaward, 1982). The only post-Atlas records are from Sea Areas 29 and 30. Populations of the animal were found living in Lochs Sween, Craignish and Hourn during the course of survey work carried out by Dr. Shelagh Smith. Jeffreys (1867, *British Conchology*) lists the Isle of Wight as a locality but gives no further details. Post-Atlas records for *O. atomus* are restricted to Lundy, (Area 21) and three Irish Sea Areas (29, 33 and 34). The species was previously unknown from the Isle of Wight.

During 1988 intensive mapping of the Island's marine mollusc fauna has resulted in living records for both species, *A. rota* from Colwell Bay and *O. atomus* from Newtown Harbour.

The *Ammonicera* site lies to the north of Brambles Chine in Colwell Bay (50° 41′N, 01° 32′W). It is a flat ledge of Tertiary limestone (Upper Eocene) that is completely covered at high tide. The surface of the ledge is rather sparsely vegetated, however, there are several elongate shallow pools with a rich macrophyte assemblage dominated by *Corallina officinalis*, *Padina pavonia* and *Cladophora* sp. Several specimens of *A. rota* were found living on weeds with the associated molluscs: *Rissoa parva*, *R. parva interrupta*, *Onoba semicostata*, *Lacuna parva*, *L. pallidula* and *Musculus discors*. Also during the present survey two dead shells of *A. rota* were found in offshore sediment samples from the eastern end of the island.

Omalogyra atomus was found alive on *Chaetomorpha linum* and *Ruppia maritima* in a lagoon in the estuary of the Newtown River (50° 43′N, 01° 24′W). The lagoon is the remnant of old salterns; it is approximately rectangular in outline with an average depth of 25 cm – the sediment is soft mud. Sheader (1987, *A Lagoon Survey of the Isle of Wight*. Field Report, Univ. of Southampton) records a salinity of 36‰. The other molluscs of the lagoon were *Hydrobia ulvae*, *H. ventrosa*, *Littorina saxatilis agg.*, *Limapontia depressa*, *Cerastoderma glaucum* and *Abra tenuis*. This appears to be the first record of *O. atomus* from an estuarine habitat in the south of England. However, Dr. Smith has said (pers. comm.) that she has found *O. atomus* living in brackish lagoons in Scotland and considers this species to be a normal resident of such a habitat.

Specimens of both *A. rota* and *O. atomus* were collected by sieving weed, however it is necessary to use a 52 BSS (0·3 mm) sieve in order to retain specimens, rather than the conventionally used 30 BSS (0·5 mm) sieve. Although the records suggest that both species are rather scarce in British waters, it seems likely that they are under-recorded owing to their very small size.

We would like to thank Mrs. Stella Turk for confirming the identification of both species and Mr. Dennis Seaward and Dr. Shelagh Smith for distribution data.

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INSTRUCTIONS TO AUTHORS

Manuscripts should be sent to:— **Dr D. T. Holyoak, School of Geography and Geology, The College of St. Paul and St. Mary, The Park, Cheltenham, Gloucester, GL50 2RH.**

PAPERS Two copies of text and illustrations should be submitted; one set of illustrations must be good quality originals. Authors should refer to recent copies of the *Journal* for a guide to format. Authors are reminded of the high cost of printing and therefore are expected to write concisely and to make maximum use of page size when designing art-work and tables.

COMMUNICATIONS These are intended to be short notes of an original nature which do not merit the treatment of a full paper. *Communications* must not contain any figures, tables or plates and should conform in style to that of recent issues of the *Journal*.

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